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EARTH OBSERVING SYSTEM
DATA AND INFORMATION SYSTEM (EOSDIS)
TEST SYSTEM (ETS)
LOW-RATE SYSTEM (LRS)
USER'S GUIDE

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Earth Observing System Data and Information System (EOSDIS) Test System (ETS) Low-rate System (LRS) User's Guide Volume 1

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PREFACE

This document provides the procedures used to operate and maintain the Earth Observing System Data and Information System (EOSDIS) Test System (ETS) Low-rate System (LRS).

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GENERAL INFORMATION

1.1 INTRODUCTION

This document provides the procedures used to operate and maintain the Earth Observing System Data and Information System (EOSDIS) Test System (ETS) Low-rate System (LRS). Development of this system is a joint effort between NASA/Goddard Space Flight Center (GSFC) Codes 521 and 522. Code 521, the Microelectronic Systems Branch, designed the custom hardware and software; Code 522, the Software and Automation System Branch, designed and developed the Telemetry Processing Control Environment (TPCE), which is the operator interface software that provides tools for controlling and monitoring ETS LRS operation.

The ETS LRS may also be controlled and monitored via the Code 521-developed Operations Manager (OPMAN) program. This user interface software runs on a VT-100 (or equivalent) terminal, and can be used to access system information in the event of a network failure. This document provides procedures and information specific to the OPMAN interface; refer to Section 3, Operations.

1.2 SCOPE

This document provides the user with all information necessary to install, set up, and operate the ETS LRS. The document is organized into five sections. Section 1 overviews the ETS LRS and provides a high-level description of hardware elements, software environment, and system data flows. Section 2 provides installation procedures and describes the controls, indicators, and front-panel connectors for all hardware elements. Section 3 addresses system operation issues, and includes a description of system commands, procedures for setting up system data flows, and definitions of status fields that appear on the various subsystems on the operator interface. Section 4 provides information on system maintenance. Section 5 lists the reference documents that support various aspects of the ETS LRS.

Appendices contain basic software configuration instructions for the various subsystems. Configuration issues are related to fundamental system data flows. Reconfiguration at this level occurs in subsystem startup scripts. Activities configurable from the startup scripts are unlikely to change over time. However, instructions are provided in the event that fundamental data flow reconfiguration becomes necessary.

1.3 SYSTEM OVERVIEW

1.3.1 PURPOSE OF ETS LRS

The ETS LRS processes return link Consultative Committee for Space Data Systems (CCSDS) Version 2 transfer frames and Command Data Blocks (CDB) that contain Command Link Transfer Units (CLTU). In return link, the ETS LRS receives serial input (via RS-422) telemetry data, synchronizes, optionally Reed-Solomon decodes, sorts according to Global Virtual Channel Identifier (GVCID), time-stamps, performs packet assembly, and creates EDOS Data Units (EDU). Real-time EDUs will be sent directly to the EOS Operations Center (EOC). All telemetry data is stored to a mass storage disk, where it can be spooled off and output via Ethernet to support rate buffering. In forward link, the system receives telecommand data encapsulated in CDBs via Ethernet, validates each CDB, extracts CLTUs from valid blocks, and outputs CLTUs for uplink to a spacecraft. Despite its specific design, the system includes many additional capabilities. Figure 1-1 illustrates an example operational configuration for ETS LRS.

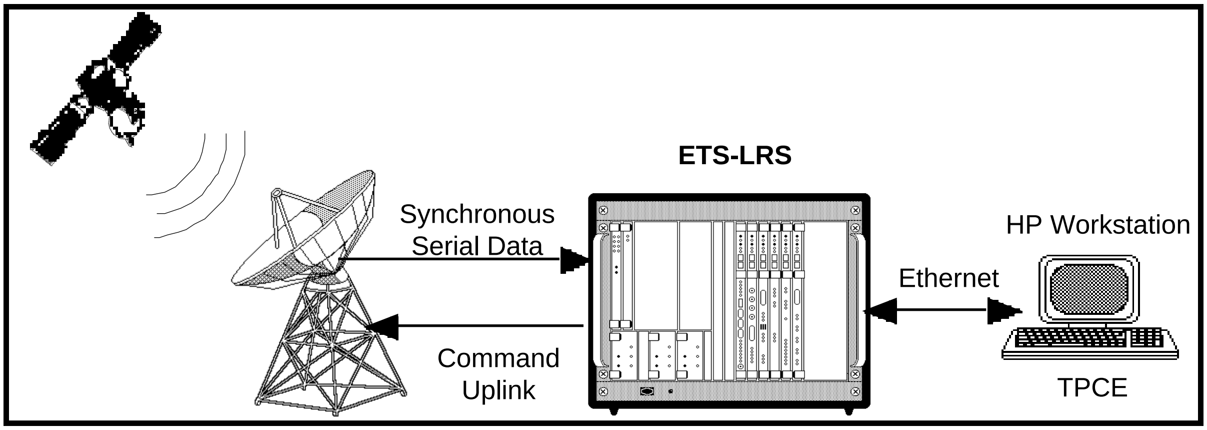
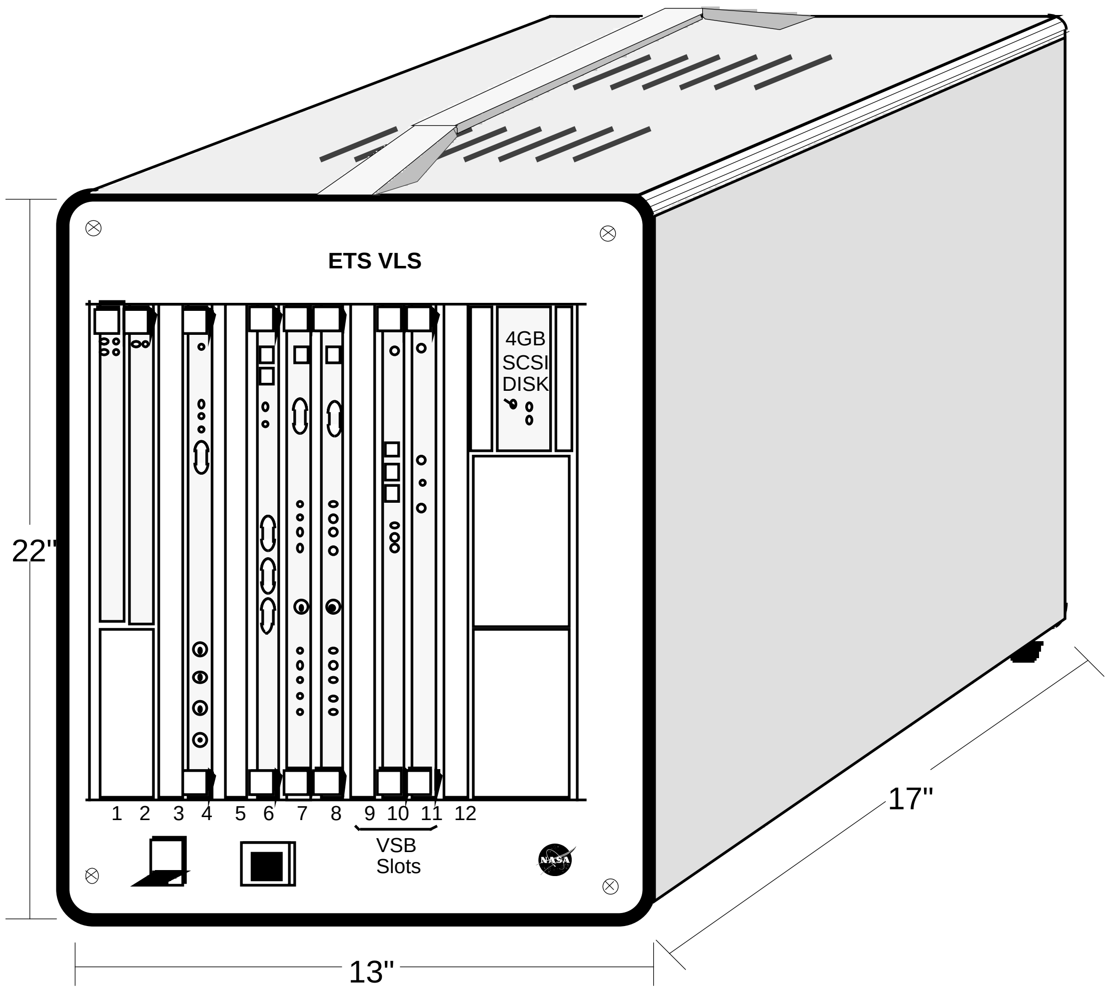


Figure 1-1. ETS LRS Configuration Overview

1.3.2 HARDWARE OVERVIEW

Figure 1-2 illustrates the ETS LRS chassis. Table 1-1 defines the system components from left to right.



1. Master Controller Card
2. SRAM Card
3. Blank Panel
4. EOS Simulator Rev A
5. Blank Panel
6. Forward Link Interface Card
7. Front End Processor No. 1
8. Front End Processor No. 2
9. Blank Panel
10. EOS Service Processor Card
11. DRAM Card
12. Blank Panel

NOTE: Cards are read from left to right.

Figure 1-2. ETS LRS Chassis

Table 1-1. Assembly Index

Assembly	Type	Part Number	Manufacturer
Master Controller Card (MCC)	6U	MVME-167-032	Motorola
Static Random Access Memory (SRAM) Card	6U, 16 Mbytes	MM6740CN	Micro Memory
EOS Simulator Card, Revision A	9U	G1527414A	Code 521/GSFC
Forward Link Interface Card (FLIC), Revision B	9U	G1490847B	Code 521/GSFC
FEP Card No. 1	9U	G1527430	Code 521/GSFC
FEP Card No. 2	9U	G1527430	Code 521/GSFC
Service Processor Card	9U	G1527421	Code 521/GSFC
DRAM Card	32 MB	MM6346D	Micro Memory
System Disk	4 Gbytes	ST 15150N	Seagate

1.3.3 SOFTWARE OVERVIEW

The ETS LRS requires some hardware interaction because the Light-emitting Diodes (LED) of each component report that component's health and processing status. However, the operator primarily interfaces with the system software. Specifically, the operator uses the local interface (OPMAN), or TPCE software, to control and monitor the system. Numerous software programs run transparent to the operator, which are used to control and monitor the system at the component level. Also transparent to the operator, OPMAN allows the user to direct these tasks; during data processing, it reports status on component operations, usually in the form of data accounting statistics.

The operator can plug the terminal into an individual component (if a component has a terminal connection, it is easily visible on its front panel), and access status information provided by the software of that card. Multiple terminals can be plugged into the LRS, which allows the operator to monitor the status reports of each card while using the OPMAN or TPCE interface.

The ETS LRS uses a custom software package called *Gateway* to communicate via Ethernet (Appendix B provides configuration information). Seven Ethernet data flow ports are used: five return link ports (4000, 4100, 4200, 4300, and 4500) and two forward link ports (6000 and 6100). In addition, TPCE software interfaces with the ETS LRS chassis via Ethernet ports 3000 and 3100. TPCE is a Code 522-designed operator interface that runs on an HP workstation using Windows.

The ETS LRS software runs in the VxWorks operating environment; therefore, any time a system prompt and blinking cursor appears on a console screen, VxWorks commands are applicable. The operator should rarely (or never) need to use VxWorks; however, it is necessary to be aware of some of its available capabilities.

1.3.4 SYSTEM SIGNAL FLOW

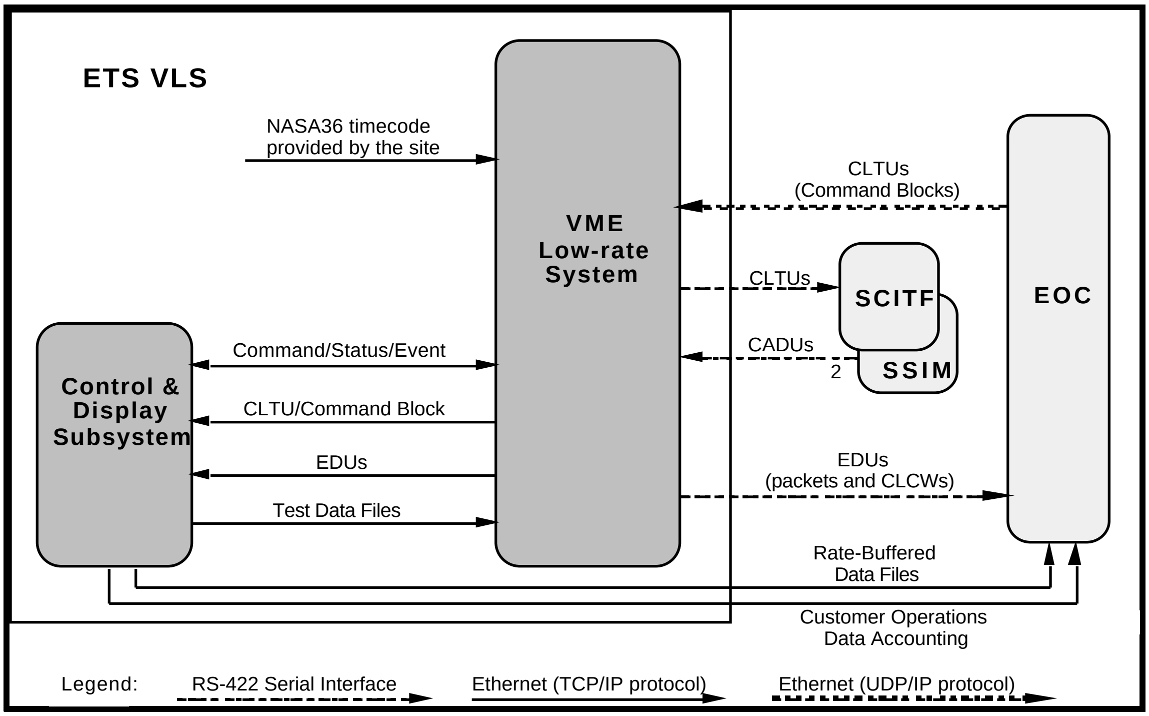


Figure 1-3. ETS LRS Data Flow Diagram

SECTION 2
INSTALLATION

2.1 INTRODUCTION

This section provides information on ETS LRS installation.

2.1.1 INSTALLATION REQUIREMENTS

a. Plug workstation and chassis into Uninterruptable Power Supply (UPS).

b. Access two Ethernet taps—one for the chassis and one for the workstation.

c. Plug terminal into power.

d. Connect NASA36 timecode source to two FEP Cards.

e. Connect a cable with a DB-15F connector to provide serial RS-422 input to a FEP Card from the data source.

2.1.2 INSTALLATION PROCEDURES

a. Verify that system Internet Protocol (IP) addresses are correct. If the system is not on a local network, check with the System Administrator to ensure that addresses are acceptable.

b. Connect all power.

c. Connect Ethernet to the chassis and the workstation.

d. To use OPMAN, connect a VT-100 terminal to the MCC Input/Output (I/O) interface panel.

e. Connect the NASA36 time source to the FEP Card front panel.

f. Bring up the TPCE workstation.

g. Verify that the hard disks are turned on.

h. Turn on power to the chassis.

i. Verify boot process on local (MCC) terminal.

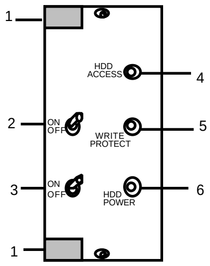
2.2 CABLE CONNECTIONS

This section overviews the external cable connections that must be in place for the system to receive input and provide output. The system is delivered installed in a chassis. For the current ETS LRS configuration, front-panel connections are EOS Simulator Card OUTPUT, FEP Card INPUT, and FLIC OUTPUT. All Ethernet interfaces are at the rear panel of the LRS chassis. If the Ethernet connection is not made, no data can be transferred between the Versa Module Eurocard (VME) rack and the Control and Display Subsystem (CDS) workstation or remote workstation.

2.3 CONTROLS, INDICATORS, AND FRONT-PANEL CONNECTORS

2.3.1 HARD DISK DRIVES

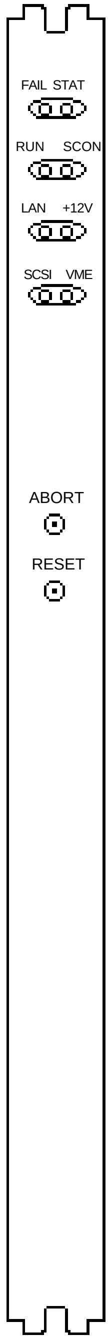
Controls and indicators for the Hard Disk Drives are defined as follows:



1. Ejector Handle: ejects disk from rack-mounted disk drive chassis. Pull up on top handle while simultaneously pushing down on bottom handle.
2. WRITE PROTECT DISK Switch: when On, prevents disk from being written to; illuminates WRITE PROTECT LED (5).
3. Power Switch ON/OFF: applies power to disk drive.
4. HDD ACCESS LED: lights when hard disk drive is accessed.
5. WRITE PROTECT LED: lights when switch (2) is On.
6. HDD POWER LED: lights when power switch (3) is On.

2.3.2 MASTER CONTROLLER SUBSYSTEM

LEDs for the Master Controller Subsystem (MVME167-32B) are defined as follows:



a. FAIL LED (red): lights when a failure in the board is detected.

b. STAT LED (yellow): status LED. The card decodes MC68040 status lines to drive this LED. A halt condition from the processor causes the LED to light.

c. RUN LED (green): when lit, indicates a local bus cycle is being executed.

d. SCON LED (green): when lit, indicates card is VMEbus system controller.

e. LAN LED (green): when lit, indicates Local Area Network (LAN) chip is local bus master.

f. +12 LED (green): lights when power is available to transceiver interface.

g. SCSI LED (green): lights when card is Small Computer System Interface (SCSI) bus master.

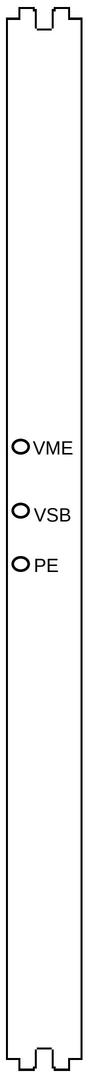
h. VME LED (green): lights when card is using VMEbus, or when it is being accessed by VMEbus.

i. ABORT Switch: not used by ETS LRS. If enabled by software, generates an interrupt at a user-programmable level that is normally used to abort program execution and return to the debugger.

j. RESET Switch: resets entire ETS LRS.

2.3.3 GLOBAL MEMORY

LEDs for Global Memory (MM6346) are defined as follows:



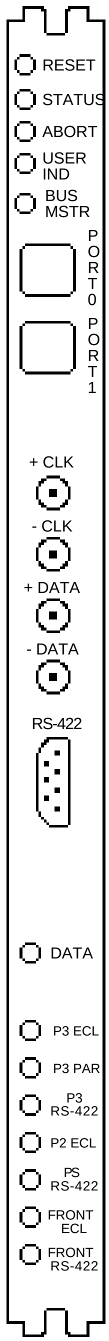
a. VME ACCESS LED (green): lights when card is accessed.

b. VSB ACCESS LED (green): lights when card is accessed.

c. PARITY LED (red): lights if parity error occurs during a read access.

2.3.4 EOS SIMULATOR CARD

Controls and indicators for the custom EOS Simulator Card are defined as follows:



a. RESET Switch: used to reset MZ 8130 and Central Processing Unit (CPU).

b. STATUS LED (red): brightly lit when CPU is halted; dimly lit during normal CPU operation.

c. ABORT Switch: sends an autovectored, nonmaskable level 7 interrupt to the CPU.

d. USER LED (yellow): in normal operation, blinks On/Off at 1-second rate to indicate that Base System Environment (BaSE) is functioning.

e. BUS MASTER LED (green): lights when MZ 8130 is VMEbus master.

f. PORT 0: RJ11 connector for serial port 0; primary serial RS-232 port.

g. PORT 1: RJ11 connector for serial port 1; alternate serial RS-232 port.

h. +CLK Connector: if card is set up to output Emitter-coupled Logic (ECL) test data via the front panel, supplies ECL +clk.

i. -CLK Connector: if card is set up to output ECL test data via the front panel, supplies ECL -clk.

j. +DATA Connector: if card is set up to output ECL test data via the front panel, supplies ECL +data.

k. +DATA Connector: if card is set up to output ECL test data via the front panel, supplies ECL -data.

l. RS-422 Connector: if card is set up to output TTL test data via the front panel, this connector supplies RS-422 test data output.

m. DATA LED (green): when lit, indicates data is being output to output ports that are enabled.

n. P3 ECL LED (yellow): when lit, indicates P3 pipeline ECL test data output port is enabled.

o. P3 PAR LED (yellow): when lit, indicates parallel test data output port is enabled.

p. P3 RS-422 (yellow): when lit, indicates P3 pipeline RS-422 test data output port is enabled.

q. P2 ECL (yellow): when lit, indicates P2 connector ECL test data output port is enabled.

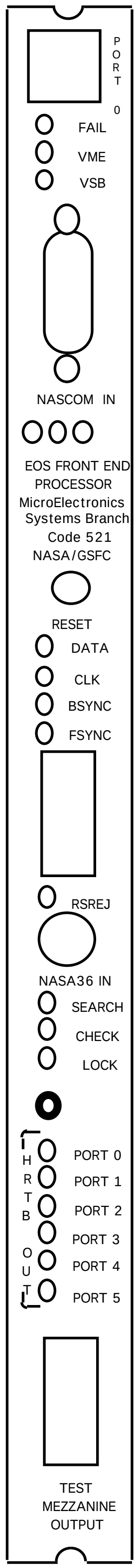
r. P2 RS-422 (yellow): when lit, indicates P2 connector RS-422 test data output port is enabled.

s. FRONT ECL (yellow): when lit, indicates front-panel ECL test data output ports are enabled.

t. FRONT RS-422 (yellow): when lit, indicates front-panel RS-422 test data output port is enabled.

2.3.5 FEP CARD

Controls and indicators for the FEP Card are defined as follows:



a. PORT 0 Connector: RJ-11 connector used for RS-232 terminal I/O.

b. FAIL LED (red): indicates system failure.

c. VME LED (green): indicates card is accessing VME address space.

d. VSB LED (green): indicates card is accessing Versa Module Eurocard Subsystem Bus (VSB) address space.

e. NASCOM IN Connector: DB-15 male connector used to accept RS-422 serial input data.

f. RESET Switch: used to send a hard reset to the CPU.

g. DATA LED (green): indicates transitions are being detected on the input serial data line as it enters the block and frame synchronization subsystems.

h. CLK LED (green): indicates transitions are being detected on the input serial clock line as it enters the block and frame synchronization subsystems.

i. BSNYC LED (green): indicates detection of a valid block synchronization pattern.

j. FSYNC LED (green): indicates detection of a valid frame synchronization pattern.

k. RSREJ LED (red): indicates current frame is rejected by Reed-Solomon Error Correction (RSEC) chip based on programmed parameters.

l. NASA36 IN Cutout: supports mounting of Timecode Mezzanine, Revision A (Subminiature Assembly [SMA] connector accepts NASA36 or IRIG B time formats).

m. SEARCH LED (red): indicates frame synchronization subsystem is in search mode.

n. CHECK LED (amber): indicates frame synchronization subsystem is in check mode.

o. LOCK LED (green): indicates frame synchronization subsystem is in lock mode.

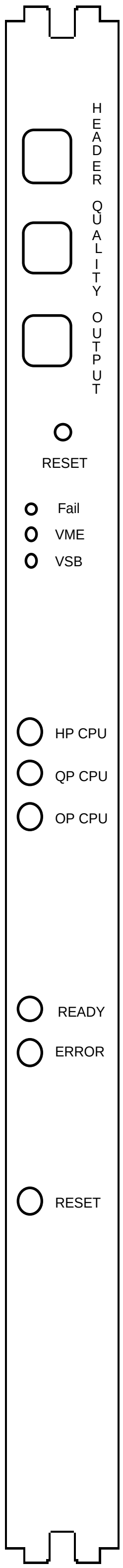
p. PORT 0-5 LEDs (amber): indicate that respective High-rate Telemetry Backplane (HRTB) output channel is physically being driven by FEP Card.

q. TEST MEZZ OUTPUT Cutout: supports mounting of Version 1 Test Mezzanines that have right-angle header connectors installed. Two cutouts are available (top not labeled) because mezzanine can reside in one of two motherboard slots.

NOTE: DATA, CLK, BSYNC, RSREJ, PORT 0-5 LEDs can be illuminated for test purposes by setting a bit in the control register, which bypasses the noted function.

2.3.6 EOS SERVICE PROCESSOR CARD

Controls and indicators for the EOS Service Processor Card are defined as follows:



a. HEADER: RS-232 port that connects the Header Processor to a local terminal.

b. QUALITY: RS-232 port that connects the Quality Processor to a local terminal.

c. OUTPUT: RS-232 port that connects the Output Processor to a local terminal.

d. RESET Pushbutton: allows operator to reset card and start card initialization routines.

e. FAIL LED (red): lights when a failure condition is detected.

f. VME LED (green): lights when VMEbus is accessed by the card.

g. VSB LED (green): lights when VSB is accessed by the card.

h. HP CPU LED (green): blinks once every second after card is booted, which indicates that Header Processor CPU is alive.

i. QP CPU LED (green): blinks once every second after card is booted, which indicates that Quality Processor CPU is alive.

j. OP CPU LED (green): blinks once every second after card is booted, which indicates that Output Processor CPU is alive.

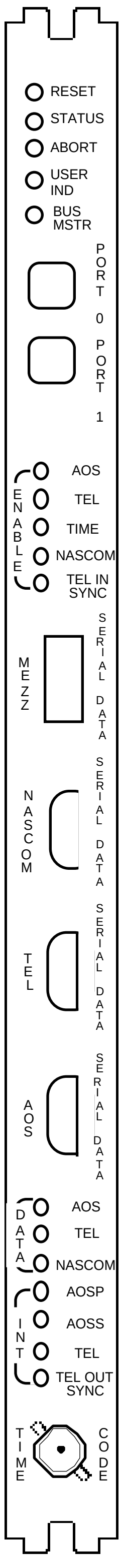
k. READY: software-controlled LED that indicates card is ready to process data.

l. ERROR LED (red): software-controlled LED that indicates card is unable to process data.

m. LAMP TEST: is used to test LEDs.

2.3.7 FORWARD LINK INTERFACE CARD

Controls and indicators for the FLIC, Revision B, are defined as follows:



a. RESET Switch: allows operator to reset MZ 8130 and start initialization routines.

b. STATUS LED (red): controlled by MC68030 CPU halt signal. Indicates MC68030 halted during a local reset, VMEbus reset, or powerup.

c. ABORT Switch: generates level 7 interrupt that may be used to abort all tasks on the card.

d. USER IND LED (yellow): blinks once per second to indicate card is alive.

e. BUS MSTR LED (green): indicates MZ 8130 is presently VMEbus master.

f. PORT 0: RS-232 port that may be connected to a terminal or printer.

g. PORT 1: RS-232 port that may be connected to a terminal or printer.

h. AOS ENABLE LED (green): indicates Advanced Orbiting System (AOS) Interface is enabled for processing and that DB-9 front-panel AOS connector is active.

i. TEL ENABLE LED (green): indicates Telecommand Interface is enabled for processing and that DB-9 front-panel Telecommand connector is active.

j. TIME Enable LED (green): indicates P3 telemetry pipeline is being driven with PB1 timecode data.

k. NASCOM Enable LED (green): indicates NASA Communications (Nascom) Interface is enabled for processing and DB-9 front-panel Nascom connector is active.

l. TEL IN SYNC LED (green): indicates an echo CLTU command was detected.

m. MEZZ Connector: cutout provides access to mezzanine mounted on the card.

n. NASCOM Connector: (DB-9) outputs differential Nascom clock and data; receives Nascom differential clock.

o. TEL Connector: (DB-9) connector outputs differential telecommand clock and data; receives telecommand differential clock.

p. AOS Connector: (DB-9) connector outputs differential AOS clock and data; receives AOS differential clock.

q. AOS Data LED (amber): indicates data is being processed by AOS Interface.

r. TEL Data LED (amber): indicates data is being processed by Telecommand Interface.

s. NASCOM Data LED (amber): indicates data is being processed by Nascom Interface.

t. AOSP Interrupt LED (red): indicates fatal processing error in parallel portion of AOS Interface.

u. AOSS Interrupt LED (red): indicates fatal processing error in serial portion of AOS Interface.

v. TEL Interrupt LED (red): indicates fatal processing error in Telecommand Interface.

w. TEL OUT SYNC Interrupt LED (green): indicates a CLTU is being transmitted from DB-9 front-panel Telecommand connector and P2 connector.

x. TIMECODE BNC Connector: accepts 1-kHz AM NASA36 timecode signal; also used to generate NASA36 timecode with 1-ms resolution, BCD flywheel timecode with 1-µs resolution, and PB1 timecode with 1-ms resolution.

2.4 MEMORY MAP CONFIGURATION

Subsystem	Memory Allocation
Master Controller (MVME167)	0000 0000
System Memory (16M) (SRAM - MM6740CN)	7F00 0000 - 7FFF FFFF (VME)
Global Memory (32M) (DRAM - MM6346D)	8000 0000 - 81FF FFFF (VME) 8000 0000 - 81FF FFFF (VSB)
Simulator Card (ES1)	D000 0000
Service Processor Card (SV1)	D180 0000
FLIC Card (FL1)	D280 0000
FEP Card No. 1 (FP1)	E000 0000
FEP Card No. 2 (FP2)	C000 0000

SECTION 3
LOCAL OPERATIONS (OPMAN)

3.1 OPMAN

3.1.1 GETTING STARTED

Once the system is turned on and a VT-100 (or equivalent) terminal is plugged into the ETS LRS chassis, the operator can use a local (residing on the MCC after the system is booted) program called OPMAN that runs on the VT-100 to control and monitor the system. Through OPMAN, the system can be set up to perform major data processing functions; each function can have minor deviations that make slight changes to system processing. Because of this versatility, system setup from the ground level is a detailed procedure; the intricacies of system setup should be handled by a user who is well-versed with the system. However, most operators will have access to a batch of system setup files that have been defined and stored. The user needs to match the correct file to the type of data that the system is expecting, and load the system with the previously stored setup. Following this procedure, the ETS LRS is ready to operate.

OPMAN catalogs are the foundation of system setup. Catalogs are files that define system configuration and data flow by defining the setup of each card included in the data flow. Therefore, catalogs also determine system output. OPMAN allows the operator to create, save, and edit catalogs. Once a catalog is created and saved, it may be accessed at any time (by name) and loaded into the system in preparation for data input.

Because setup is usually predefined, the operator's main task involves monitoring system processing. OPMAN provides a series of "Status Pages" for this purpose, which provide detailed information on system processing. The types of status information available start at the top level and continue to the input, output, and processing that occurs on each card. In addition to Status Pages, the operator can monitor system status by observing the LEDs on the front panel of each card. The lighting and dimming of LEDs, especially those on the custom portion of each card, reflect system processing.

Figure 3-1 overviews local operation of the ETS LRS. OPMAN runs on the operator's console (asynchronous terminal, VT-100 or equivalent) connected to J13 on the I/O panel.

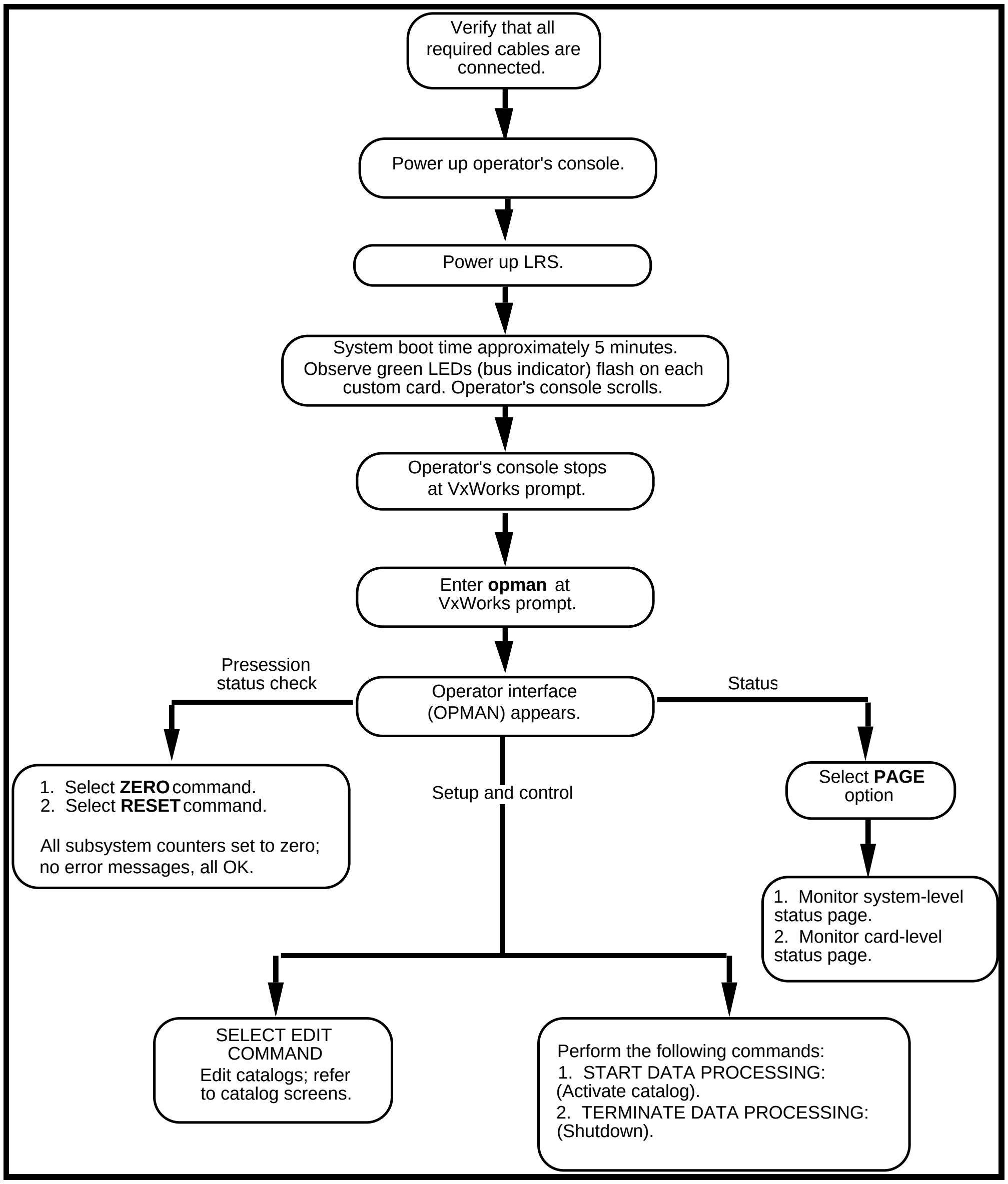


Figure 3-1. Flow Diagram for Local Operation of ETS LRS

3.1.2 OPMAN MAIN MENU

The OPMAN Main Menu appears on the local terminal after system bootup. The Main Menu is the list of 14 commands that appears at the bottom of the screen. The top of the screen displays the Help screen, which provides the user with directions for implementing the available commands and moving around the OPMAN screens. To return to the Help screen at any time, select the Page option and select Help. The Main Menu provides all commands that an operator needs to set up the ETS LRS using a previously created OPMAN catalog. It also allows the operator to create a new catalog and access the Status Pages. The following sections describe each command available from the Main Menu.

3.1.2.1 Page

```
                              (Help Screen)

                      OPERATOR INTERFACE (OPMAN)           07/12/94 10:25:03
       -------------------------------------------------------------------------------
Use the arrow keys to move the marker through any menu.
You may also move the marker by pressing the first letter of an option.

When the marker is adjacent to a desired option, press ...

    RETURN  to select the option
    EXIT    to exit the current menu

The EXIT key will also work for any prompt.

When messages are reported and the cursor rests on the '+' character,
press any key to continue.

Key Definitions:   Up:        Up         Exit: ^G, ESC-, or ESC-C
                   Down:      Down
                   Left:      LEFT       Next-Page: PF4, F4, NEXT, or ^V
                   Right:     RIGHT      Prev-Page: PF3, F3, PREV, or ESC-V
----------------------------------------------------------------------------

 Page     Activate         Zero     Load      eNable      Commands     Flush
 Quit     Shutdown         Edit     Reset     Disable     dIrectory    Test
```

3.1.2.2 Quit

The Quit command exits OPMAN and returns to the VxWorks prompt. To return to the operator interface once Quit has been implemented, enter **opman** at the VxWorks prompt. Quit exits the OPMAN operator interface. Quit includes one verification question that prompts the user beforehand, so that inadvertent implementation is prevented.

3.1.2.3 Activate

The Activate command is the equivalent of a combination of Reset, Load, and Enable: it resets, loads, and then enables a catalog. If the catalog includes an ETS LRS simulation source (EOS Simulator Card), this command initiates a data flow because the data source is enabled. However, if the data source is exterior to ETS LRS, this command prepares the system to receive data, and data flow through the system begins when the data source begins data input.

The Activate command includes all cards in the catalog, but before implementation, it prompts the operator with a list of the included cards (indicated by an X in front of the card name). To exclude one of the cards from the data flow, remove the X and leave a blank in its place—that card will not be included in the Activate command.

3.1.2.4 Shutdown

The Shutdown command disables and flushes selected subsystems. This command can be used to interrupt a data flow; upon its implementation, data flow stops. The Shutdown command should always be implemented before a new catalog is activated.

The Shutdown command includes all cards currently enabled, but before implementation, it prompts the operator with a list of the included cards (indicated by an X in front of the card name).

To exclude shutdown of one of the enabled cards, remove the X and leave a blank in its place—that card will not be shut down.

CAUTION: This command clears the catalog name from all Status Page results.

3.1.2.5 Zero

The Zero command sets the counters on all cards to zero. Upon implementation, all Status Page values are immediately set to zero. Zero can be implemented during a data flow, but all Status Page final results reflect the processing that occurred after the Zero command was implemented.

After a data flow ends and the results are recorded, it is recommended that the operator zero all counters before the next data flow starts. Unless a new catalog is activated, counters are not automatically zeroed. Even if a new catalog is activated, if that catalog does not include all cards used in the previous data flow, the status of cards not included in the current catalog are NOT zeroed; this can cause confusion when examining results.

3.1.2.6 Edit

The Edit command allows the user to edit an existing catalog stored in system memory, or to create a new one. If a catalog has been loaded into memory (an Activate, Load, or Edit command has been implemented), the Edit command immediately defaults to this catalog—it allows the operator to view the Setup Pages of that catalog.

To edit a catalog when a catalog is not loaded into memory, implement the Edit option and enter the catalog name at the prompt—or press Return at the prompt to create a new catalog. (To verify a catalog name, implement the fileInfo option, which lists the stored catalog names.) To create a new catalog when a catalog is loaded into memory (or to edit a different catalog than that currently loaded), proceed as follows:

a. Implement Edit. When the Edit window appears, which lists the cards included in the edit, press Enter. (This accesses the subsystem Setup Pages.)

b. Press the ESC key twice, which causes a new window to appear.

c. Select the Erase option (E) displayed in the window. This erases any changes made to the current catalog loaded into memory since the last save. If new changes to that catalog need to be saved, implement the Save option (S) before the Erase option.

d. Implement the Edit option. To create a new catalog, leave the prompt for a catalog name empty and press Return. To edit a previously stored catalog, enter the catalog name at the prompt.

3.1.2.7 Load

The Load command downloads setup parameters from a previously created catalog to all cards included in that catalog. This command alone does not prepare cards for a data flow, or in the case of a catalog that includes the data simulation source, it does not start the data flow. It simply initializes the cards to process according to that catalog's setup.

The Load command includes all cards in that catalog, but before implementation, it prompts the operator with a list of the included cards (indicated by an X in front of the card name). To exclude one of the included cards, remove the X and leave a blank in its place—that card will not be loaded.

3.1.2.8 Reset

The Reset command clears all counters and registers; both hardware and software. Status Page values are also zeroed as a result. Typically, the Reset command is used before a data flow to initialize system components, and zero all counts from previous data flows. It can also be used as a system health check.

The Reset command defaults to all cards included in the system. However, before implementation, it prompts the operator with a list of the system cards, indicated by an X in front of its name. To exclude one of the cards, remove the X and leave a blank in its place—that card will not be reset.

3.1.2.9 Enable

The Enable command "turns on" cards. It is the final step to prepare the system for data processing; if the Enable includes the data simulation source, it also begins the data flow.

The Enable command defaults to all cards included in that catalog. However, before implementation, it prompts the operator with a list of the included cards (indicated by an X in front of the card name). To exclude one of the cards, remove the X and leave a blank in its place—that card will not be enabled.

For typical operation, the operator uses the Activate command, which includes an Enable. Therefore, the operator rarely implements an Enable command.

3.1.2.10 Disable

The Disable command "turns off" cards. Cards unnecessary to a data flow are disabled in order to avoid confusion during processing.

The Disable command defaults to all cards included in that catalog. However, before implementation, it prompts the operator with a list of the included cards (indicated by an X in front of the card name). To exclude one of the cards, remove the X and leave a blank in its place—that card will not be disabled.

Typically, the operator implements a Shutdown command at the end of a data flow. A Shutdown includes a Disable; therefore, the Disable command is rarely implemented.

3.1.2.11 Commands

The Commands option accesses a variety of system functions that are primarily designed for debugging. This command does not influence data processing in any way. This is a good option to spend time "playing with" to better understand all of the functions that it makes available.

3.1.2.12 Directory

The Directory command provides "directory" functions. It lists the catalogs available in each directory. The catalog lists include a brief description of each catalog; descriptions are written by the catalog author—their accuracy and level of detail are a reflection of that author and not the system itself.

3.1.2.13 Flush

The Flush command forces cards to output data that may not have completed system processing when data flow stopped; thus, that data was not pushed through the final phase of processing by the succeeding data (this situation is frequently described as data being stuck in the telemetry pipeline). By flushing all remaining data, this command ensures that the card subsystems are empty and ready for a new data flow. If data is "stuck in the pipeline" when this command is issued, the Status Page values actually increase to reflect that more data has completed processing.

Many of the cards' Setup Pages provide timeout values; when set, they cause an automatic flush of data when data input has stopped for a programmable length of time. However, it is recommended that the operator always implement the Flush command at the end of a data flow in case a timeout value was not set.

Like many of the preceding commands, Flush prompts the operator with a list of cards that are flushed by default (indicated by an X in front of the card name). To remove a card(s) from the Flush command, remove the X and leave a blank space in its place—that card will not be flushed.

3.1.2.14 Test

The Test command runs a self-test on each card selected. Health and status are displayed on the Status Pages available via the Page command. Typically, this command is not used after the system design and test phase.

CAUTION: If data is flowing when the Test command is initiated, data is interrupted and destroyed.

3.2 CATALOGS (ETS LRS SETUP)

OPMAN catalogs are the setup files that are loaded onto the ETS LRS to prepare it for an operational data flow, or to start a test data flow that includes an ETS LRS internal data source. Creating a new catalog and editing old catalogs are both accomplished using the Edit command available from the OPMAN Main Menu.

First, the operator must understand that he/she is essentially setting up the custom chassis portion of the ETS LRS rack; on that chassis, the operator is setting up only the custom software. Disk modules play an active role in system processing, but the operator does not actually set them up. If a catalog (the system setup) requires the use of several cards, make sure that these cards are selected with an asterisk. Catalogs are organized according to the card, mezzanine, or module that is being set up. A card can have one Setup Page, or as many as required.

This section describes the pages that can be included in an OPMAN catalog; not every page explained has to be present. The following screen is the first to appear after implementing the Edit option; it allows the operator to select which cards are included in the catalog:

```
                              Edit?

  OK.  Continue
  Canel. Never mind.
* TBP  :  EOS TBP Standard Setup
  CBP  :  CBP Setup
* SV1  :  Service Processor
  FL1  :  Forward Link
* FP1  :  FEP Card
* FP2  :  FEP Card
* ES1  :  Sim Subsystem
```

An asterisk (*) before a card name indicates that a card is included; removing the asterisk and replacing it with a blank space removes that card from the setup file. If the card does not play an active role in data processing, it should be removed from the catalog. Although it can be excluded at the time of catalog activation, it can cause confusion or incorrect data processing if left as part of the catalog and inadvertently activated.

To set up a new catalog, or to edit an old catalog, press Return. Once the editing process begins, PF4 advances forward through the catalog page by page. PF3 advances backward through the catalog by the first page of each card's setup. Press ESC twice to access a screen that describes the catalog and provides options to save, erase, or continue editing. To return to the OPMAN Main Menu without implementing any of these options, press ESC twice more. This screen also allows the operator to name the catalog, enter a brief description of the catalog, create multiple versions of catalogs with the same name, and save the catalog to a specific directory.

NOTE: The Save option overwrites the last setup saved with that same catalog name and version.

3.2.1 EOS SIMULATOR CARD SETUP

```
     Simulator Card                    SETUP            THU FEB 23 14:29:03 1996

      ------------------------------------------------------------------------------

DATA FILE SET
   Data File.....>/ets/data/lrsclean.cadu_________________
   Bytes/frame...>256___         Frames[0=all]..........>0_______
   Update........>NO_            Update by SCSI.........>NO_

CLOCK INPUT
   ExterClock....>NO_            ClkMode REVA ONLY......>0_
   DataRate MHZ..>.512____       (0=cont,1=invCont,2=gated,3=off)

SIMULATOR SETUP
   RS422 (Freq < 20 MHZ) output to the card  FS..........>YES
   Frame Output Mode (0=RI, 1=FI, 2=RT, 3=FT)............>3_
   Running Mode (0=No*xfer, 1=1*xfer,2=X*xfer,3=forever..>2_
      If Run*Mode=2, Enter * of Frames.........>14002_____
   CRC..>NO_    RS ..>NO_   BTD..>NO_    Interlv (1-8)...>1_
   Slip .............>NO_
    Slip1:Gain.......>NO_          Slip2:Gain...........>NO_
     bits(0-3).......>0_             bits(0-3)..........>0_
     Frame position..>0_______       Frame position.....>0_______
     Byte in Frame...>0_____         Byte in Frame......>0_____

Use the RETURN key and arrow keys to move around the page.
Next-page ^V, F4, PF4
Prev-pageESC-V, F3, PF3      Exit ^G, ESC-C, ESC-ESC
```

EOS Simulator Card setup fields are defined as follows:

Data File Name: Define test data source file name. Data file name must have one of the following extensions: `.FRM` (indicates frame data) or `.BLK` (indicates Nascom block data, which is not typically used as input to ETS LRS).The data file is generated using Spacecraft Test Pattern Generator (SCTGEN) software.

Byte per Frame: Define number of bytes to be generated within a frame.

Frames: Define number of frames to be generated during a test.

Update: Specify if test data is generated with required update information.

Update by SCSI: Select No.

External Clock: Select a clock source for card.

Clk Mode: Define clock type (e.g., Continuous [0], Invert Continuous [1], Gated [2], or Off [3])

Data Rate (Mhz) : Define rate at which data is output from the card in Mbps.

RS-422 Output to Card: Select YES

Frame Output Mode: Define output clock and data mode in Reverse Inverted (RI), Forward Inverted (FI), Reverse True (RT), or Forward True (FT).

Running Mode: Defines total number of data units (frames or blocks) output from the card each time it is activated, or sets up the card to continuously output data (after activation) until it is shut down. To define a fixed number of data units output from the card, enter 2. Then, enter the number of data units to the right of the Run*Mode=2, Enter * of Frames field. To select continuous data output, enter 3.

CRC: Select if Cyclical Redundancy Check (CRC) encoded data is to be included.

RS: Select if Reed-Solomon encoded data is to be included.

BTD: Select if bit transition density data is to be included.

Interleave: Select the interleave level (1 for ETS-LRS) for Reed-Solomon encoded data.

Slip Function: Select the gain/loss factor and number of slip bits in tolerance.

Frame Position: Select the frame position (e.g., 5th frame) in a string of the data set.

Byte in Frame: Specify the byte in frame which slip occurs.

3.2.2 FRONT-END PROCESSOR CARD SETUP

The FEP Card main setup serves as a data flow diagram and as a menu of setup windows. Data flow is viewed as entering the FEP Card from an entry in the left Input column. Data flows to the right into the corresponding subsystem in the Functions column, and then flows down through all other activated subsystems in the columns. Data flows to the two standard output channels and the HRTB.

Because of the complexity of the card, setup should be entered in the same order as the flow of data through the card. Parameters in the later subsystems depend on the setup of parameters in the earlier subsystems. If the earlier subsystems are changed after the later subsystems are set, some parameters that cannot be calculated will be cleared, and the software will announce that these have been changed. This is known as a "backwards setup," so it is always best to set up the card in the order of the data flow.

Throughout the setup program there are various types of data entry. Numeric entries with a limited setup of possible values perform automatic error checking when a new value is entered. If the new value is outside the possible values, it will be rejected. Many form entries toggle between two set values, usually Enable/Bypass or Yes/No when the Return key is pressed. Entries with a small set of possible fixed values will have a popup menu to select from. Press Return on the desired entry to select it, or press ESC-ESC to leave the menu without changing the previous setup. Complex popup setup windows with several parameters are closed by pressing ESC-ESC. For online help on a particular entry, press CTRL-A. A popup window will explain the parameter in greater detail. The main setup page for FEP Card is as follows:

```
                              Front End Processor Setup Page

Input         Functions       VME 1         VME 2         Out HRTB

RS Front1     Input MUX
              Nascom (Not Used) _________     _________     _________
_________     Frm Synch
_________     Frm Annot
_________     RS Decode
_________     Frm Serve
               (Ports)__1    _________                    HRTB 0__
               \  \  \__2    _________     _________     _________
                \  \____3    _________     _________     _________
                 \______4                  _________     _________

 Use the RETURN key and arrow keys to move around the page.
 Next-page  ^V, F4, PF4
 Prev-page  ESC-V, F3, PF3                Exit ^G, ESC-C, ESC-ESC
```

3.2.2.1 Input Select

Click on the Input column to display the InputMux window. The entry description describes the data source; the position in the Input column determines which subsystem receives the data. Use the following procedures to set the Input column:

a. Move the cursor into the Input column across from the corresponding subsystem that will receive the data. In most cases, this will be the InputMux.

b. Press Return to display a menu selection of the data sources available for that subsystem.

c. Move the cursor bar down to the desired input source and press Return to select it. To leave this menu without changing the previous selection, press ESC twice.

For ETS low rate setup, select RS-422 Front 1 across from the InputMux.

```
                              InputMux

Not Enabled
RS-422 Front 1
RS-422 Front 2
RS-422 Back 1
RS-422 Back 2
CPU driven
Test Data Gen

Use the RETURN key and arrow keys to move around the page.
Next-page  ^V, F4, PF4
Prev-page  ESC-V, F3, PF3               Exit ^G, ESC-C, ESC-ESC
```

3.2.2.2 Functions Column

Click on the Functions field of the main FEP Card setup to select one of the InputMux options. This subsystem processes serial data before it is synchronized.

Invert Serial Input Clock: inverts clock signal. Default is set to No.

Serial Data Decoding: sets serial decoding method (NRZ-L, NRZ-M, or NRZ-S). Default is set to NRZL.

Data Delay level: can be set from 0 to 16. Default is set to 0.

```
                              Functions

Input Processor

Invert Serial Input Clock:   No_
Serial Data Decoding     :   NRZL
Data Delay level         :   00

Use the RETURN key and arrow keys to move around the page.
Exit ^G, ESC-C, ESC-ESC
```

If the user advances to Frame Synchronizer of FEP Card setup, the following window is displayed:

```
                          Frame Synchronizer Setup

Accept  True__ & Forward__ Sync Patterns     Frame Size    :  0256
        Forward            Reverse           Data Compr    :  Bypass_
Sync  0x1ACFFC1D         0xB83FF358          Corr Invert   :  None
Mask  0xFFFFFFFF         0xFFFFFFFF          Reverse Data  :  No_
Size     4 bytes                             Flywheel Dur  :  00
Bit Tol Fw-Tru   Fw-Inv   Rv-Tru   Rv-Inv    Check Dur     :  00
Search  00       00       00       00        S/c Slip Tol  :  00
Check   00       00       00       00        L/F Slip Tol  :  00
Lock    00       00       00       00        Best Match    :  No_
CRC Check  :Bypass    PN Decoding: Bypass    Output On     :  Lock_

                              ESC-ESC to exit
```

The Frame Synchronizer subsystem performs HST data compression, frame synchronization, CRC checking, and pseudo-noise decoding. Fields are defined as follows:

Accept and Sync Patterns: sets the types of synchronization patterns the subsystem will look for: True/Invert/Both and Forward/Reverse/Both. Default is True and Forward.

Sync Pattern, Forward and Reverse: synchronization pattern is set with these two entries. Setting the forward synchronization pattern triggers the software to automatically calculate and set the reverse synchronization pattern. Default is set to 0x1ACFFC1D.

Mask Pattern, Forward and Reverse: determines which bits in the synchronization pattern are valid. Like above, setting the forward mask value automatically calculates and sets the reverse mask value. Default is 0xFFFFFFFF.

Size: size in bytes of synchronization pattern (from 1-4 bytes). Default is set to 4.

Bit Tolerances: there are 12 programmable bit tolerances for **search, check**, and **lock** modes. Each mode can be set for different tolerances of the types of data: forward-true, forward inverted, reverse-true, and reverse-inverted. The range of bit tolerances is 0 to the number of bits in the synchronization pattern. Default for all is 0.

CRC Check: enables or bypasses Cyclical Redundancy Check function. Enabling this brings up a form to set up CRC function parameters:

CRC Initial State: determines initial state of the CRC function. Can be 0 or 1. Default is set to 0.

Include Sync Patt: should be set if CRC code includes the synchronization pattern. Default is set to No.

CRC Polynomial: default value is the CCSDS-recommended value of 0x1021.

PN Decoding: enables or bypasses the pseudo-noise decoding function. Enabling this brings up a form to set up PN function parameters:

Include Sync: tells PN decoder to include synchronization pattern in the PN decode. Default is set to No.

Forward Only: when set, PN decoder will decode forward data only. Default is set to No.

Polynomial: sets pseudo-noise to (x^8 + x^7 + x^5 + x^3 + x^0) or (x^8 + x^5 + x^3 + x^1 + x^0). Default is set to 8 7 5 3 0.

Reverse Start: initial value for reverse pseudo-noise decoding. Default is set to 0.

Frame Size: sets size of frame after it passes through the HST data compression function. Allowable range is 7-4096 bytes. Default is set to 256.

Data Compr: controls HST data compression function. HST data compression performs an 8-1 reduction on incoming data. The function can be bypassed, enabled, set to detect inverted data, or set to correct inverted data. Default is set to bypassed.

Corr Invert: corrects inverted data, inverted synchronization patterns, or both inverted data and synchronization patterns. Default is set to None.

Reverse Data: corrects reversed data. Default is set to No.

Flywheel Dur: sets flywheel duration. (range of 0-15 errors). Default is set to 0.

Check Dur: sets check duration (range of 0-15 errors). Default is set to 0.

S/C Slip Tol: sets slip tolerance for search and check modes (range of 0-3 bits). Default is set to 0.

L/F Slip Tol: sets slip tolerance for lock and flywheel modes (range of 0-3 bits). Default is set to 0.

Best Match: enables best-match strategy, which sets up Frame Synchronizer to look through each frame for the occurrence of the synchronization pattern with the least number of errors. Default is set to No.

Output On: sets up Frame Synchronizer to output frames during lock phases, check phases, or all phases. Default is set to Lock.

When the user advances to the Frame Annotator page of FEP Card setup, the following window is displayed:

```
Frame Annotater Setup
Annotation Format  : No
Frame Length 0266  : No  (Auto Set)        256  (bytes)  LRS Frame
User Sign  0x0000  : No                      2  (bytes)  Frame Quality
Frame GVCID        : No                      8  (bytes)  Time Code
Block Quality      : No                    ---
Frame Quality      : Yes                   266  (Frame Length  bytes  with anotation)
Bit Offset         : No
Time Source  : Mezzanine
# Fill Bytes       : 0                                 |-----------Frame  256 -----------  |
                                           __2____8_____  4____________________________
                                           | QA |  TIME   | SYNC |       Encoded  Data
|
                                           \_____  14   _____ /
```

The Frame Annotation subsystem annotates the frame with a header containing various information about the frame. Many entries add a certain number of bytes to the header. If none of these entries are active, the subsystem can be considered Bypassed; it will be removed from the main-level function list.

Annotation Format: adds 2 bytes to the annotation header and describes data in the annotation header. Default is set to Yes. For ETS low-rate setup, set annotation format to No.

Frame Length: numeric entry is the length of the frame as it leaves the Frame Annotation subsystem. If the frame source is the Frame Synchronization subsystem, this field will be calculated automatically. If the frame source is an HRTB port, this field can be edited. The Yes/No entry adds a 2-byte description of the frame length in the annotation header. Default is set to No.

User Sign: numeric entry is a freely editable 4-digit hexadecimal number user signature. The Yes/No entry puts the 2-byte user signature in the frame annotation header. Default is set to No.

Frame GVCID: adds a 2-byte description of the frame GVCID to the frame annotation header. Default is set to No.

Block Quality: adds a 2-byte description of the block quality status from the Nascom deblocker to the frame annotation header. Default is set to No.

Frame Quality: adds a 2-byte description of the frame quality status from the Frame Synchronizer to the frame annotation header. For ETS low-rate setup, set frame quality to Yes.

Bit Offset: adds a 2-byte description of the bit offset to the frame annotation header. Default is set to No.

Time Source: two timecode sources can be added to the frame annotation header: timecode from the Nascom block, which adds 6 bytes, and timecode from an optional Timecode Mezzanine, which adds 8 bytes. Default is set to Mezzanine.

 # Fill Bytes: adds a number of fill bytes, generally used to align the entire frame and header to a longword boundary. 0-3 bytes can be added. Default is set to 0.

If the user advances to the Reed-Solomon page of FEP Card setup, the following window is displayed:

```
                         Reed-Solomon Setup
  Subsystem           : Enable
  Encoded Data Offset : 14
  Frame Length        : 0266
  R-S (10,6) Header   : Detect
  R-S (255,223) Block : Correct
    Codeword Length   : 252
    Interleave Level  : 1
  RS Qual Annotation  : Enable
    Static Ann: 0000000000000000
  Reject Unroutable   : Yes
       Uncorrectable  : Yes
              Short   : Yes
              Long    : Yes
       Output Template: Custom______

ESC-ESC to exit
```

Reed-Solomon setup fields are defined as follows:

Subsystem: enables or bypasses entire Reed-Solomon subsystem. Default is set to Enabled.

Encoded Data Offset: if source of frames is Frame Annotation subsystem, the encoded data offset is automatically set to the length of the annotation header plus the size of the frame synchronization patterns. If source of frames is the Test Mezzanine, this entry can be edited.

Frame Length: as with encoded data offset, if source of frames is Frame Annotation subsystem, the frame length is automatically set. If source of frames is FEP Test Mezzanine, this entry can be edited.

R-S (10, 6) Header: Reed-Solomon (10, 6) header error checking and correction function can be enabled to check for errors (Decode), enabled to correct errors (correct), or bypassed. Default is set to bypassed.

R-S (255, 223) Block: Reed-Solomon (255, 223) block error checking and correction function can be enabled to check for errors (decode), enabled to correct errors (correct), or bypassed. This function is locked to bypass if the Frame Synchronizer CRC check is enabled. Default is set to bypassed.

Codeword Length: length has a range from 33-255 bytes. Default is set to 33. For ETS low-rate setup, set codeword length to 252.

Interleave Level: sets interleave level (range from 1-8). Default is set to 1.

RS Qual Annotation: generates a 32 byte quality annotation block. Default is set to bypass.

Static Ann: 16-digit static annotation pattern appears in the Reed-Solomon quality annotation block. Default is set to 0000000000000000.

Reject Unroutable: rejects all unroutable frames. Default is set to No.

Uncorrectable: rejects all uncorrectable frames. Default is set to No.

Short: rejects all short frames. Default is set to No.

Long: rejects all long frames. Default is set to No.

Output Template: formats the data for output. The Reed-Solomon subsystem writes the frame into an internal Random Access Memory (RAM) and appends it with the quality annotation trailer. Output is defined by setting one to four processes (selected blocks of data) to be output from the Reed-Solomon subsystem. For simpler programming of the output processes, standard templates are available.

None: no output is generated; should not be selected.

Frame Only: outputs frame without Reed-Solomon annotation.

RS Ann + Frame: outputs Reed-Solomon annotation first, followed by the frame.

ETS Template: outputs frame header, followed by a selected 4 bytes from the Reed-Solomon annotation, and then the frame.

ETS Demo: template specifically designed for ETS low-rate demo.

Custom: brings up an editor that will allow the user to set up the output processes directly. The four processes are defined by start position in the RAM and the length of the process. The GVCID location entry describes where in the output order the GVCID will be found. This is used in the routing function later.

Because the custom template is set up using pure numbers, and not functions based on the lengths of the frame, header, or trailer annotations, the setup software cannot apply "backwards setups" to the custom template. If the custom template is used, editing in the Frame Synchronizer or Frame Annotation subsystems may force the setup software to clear the custom template.

An added feature of the template is that it will show the current settings as set by other output templates. This can be useful in understanding how the card is set up, and the card will function normally operationally, but viewing a standard template from the custom editor effectively switches to the custom template, and then the Editor will not be able to handle backwards setups. It is always best to reset the output template to the desired standard template after viewing it in the custom editor.

Double click on the custom template to display the following Reed-Solomon Output Setup subwindow. Make sure that setup for the LRS is as shown:

```
                                                             |-----------Frame  256 -----------  |
                                                __2____8_____   4___________________________
                                                | QA |  TIME   | SYNC |        Encoded  Data
|
Reed-Solomon Set                                \_____  14   _____ /
   Subsystem          : Enable                        /
   Encoded Data Offset : 14   ----->(Auto set  to)
   Frame Length        : 0266 ----->(Auto set  by Frame annotation  see above  256+ 2+ 8)
   R-S (10,6) Header   : Detect
   R-S (255,223) Block : Enable
     Codeword Length   : 252
     Interleave Level  : 1
   RS Qual Annotation  : Enable       \-----------------------------
     Static Ann: 0000000000000000     /                              \
   Reject Unroutable   : YES                                          \
       Uncorrectable   : YES                                           \
               Short   : YES                                            \
                Long   : YES                                             \
        Output Template:  Custom                                          \
      /                                                                    \
Output Template                                                            \
Frame only                                                                  \
RS Ann+Frame                                                                 \
ETS Template                                                                  \
ETS-Demo
Custom                                      |-----------Frame  256 ----------|
    /                         __2____8_____  4_________________________________   32_______
Custom set-up                 | QA |  TIME   | SYNC |       Encoded  Data          |   RS
Quality       |
Start Length
1 0010  0256  VCDU          0   2       10                              266
2 0000  0002  Quality
3 0002  0008  Time
4 0266  0032  RS Annotation
GVCID Loc 04
                                   Sequence    _______________________
                                          1   |_VCDU____________________|
                                               ______
                                          2   |_QA__|              (2 bytes)
                         To Service            _________
                            Processor      3   |_TIME____|            (8 bytes)
                                               ______________
                                          4   |_RS Quality_____|   (32 bytes)
```

When the user advances to the Frame Server page of FEP Card setup, the following window is displayed. The Frame Server subsystem performs frame-level services and outputs data to up to four different ports. The setup block is divided into four sections; subsystem setup should follow these sections in order.

```
                                  Frame Server Setup
1) Define Services
   A. ______________
   B. ______________
   C. ______________

2) Select Fixed
   Port 1: Table____
   Port 2: Disabled______
   Port 3: Disabled______
   Port 4: Disabled______

3) Select Routed
   Table:_fp1rte_______
          Edit    Load
          Clear   Save

4) VCID Status

 Use the RETURN key and arrow keys to move around the page.
 Exit ^G, ESC-C, ESC-ESC
```

Define Services: seven types of frame-level services are available from the Frame Service subsystem. Six are programmable, and fall into three categories: fixed services, routing services, and both. Three programmable "slots" are available for three categories: A, B, and C.

Category A: can only be one of the following fixed services:
- Insert
- Insert with annotation
- VCDU/SLC
- VCDU/SLC with annotation

Category B: can be any one of the following services:
- Insert
- Insert with annotation
- VCDU/SLC
- VCDU/SLC with annotation
- VCA
- VCA with annotation

Category C: can only be one of the routing services:
- VCDU/SLC
- VCDU/SLC with annotation
- VCA
- VCA with annotation

The services are:

No Service: only nonprogrammable service; available as a fixed or routing service.

Insert: a fixed service. When defining this service, a small window will prompt for the defined insert length.

Insert with Annotation: identical to insert service, except annotation is output with the frame.

VCDU/SLC: although VCDU and SLC are technically two different services, the FEP setup software views them as the same. The only difference is when it is selected (in Section 2) as a fixed service, and is called SLC, and when it is selected (in Section 3) as a Routing service, and called VCDU. Not used in ETS.

VCDU/SLC with Annotation: identical to VCDU/SLC, except annotation is output with the frame. Not used in ETS.

VCA: a routing service. Internal setup requires the software to know which type of trailer type the frame has: CRC or Reed-Solomon. If neither have been set up, the software will prompt for the type used. Not used in ETS.

VCA with Annotation: identical to VCA, except annotation is output with the frame. Not used in ETS.

Fixed Services: after selected services are defined, each service can be attached to output ports as needed. If an output port is not being used by a routing service, it can be set to output one of the defined fixed services:

Disable: there is no defined service
No service
Programmable service A (if defined)
Programmable service B (if defined with a fixed or either service)

An output port defined with the service Table has been used by the routing table, and cannot be set with a fixed service. For ETS low-rate setup, set Port 1 to No Service.

Select Routed: select routing services by programming the routing table. It is important to understand that the routing table is not sent to the FEP Card directly with a Load command. The routing table is 64 Kbytes long, and is too large to send as part of the standard Load command—therefore, the file name of the routing table is sent. For convenience, FEP setup software has a built-in routing table editor. The table is not automatically saved—the user must use the Save button when the table is changed.

Table: name of file that holds the routing table. If this file name is set from a catalog load, entering Frame Server setup will automatically load this routing table into the editor.

Edit: brings up the routing table editor, which lists GVCIDs on the left and services sent to each port for that GVCID on the right. For convenience, the GVCID is split into three columns: Version (V), Spacecraft ID (SCID), and Virtual Channel ID (VCID). Version, Spacecraft ID, and VCID collapse into a GVCID.

Changing any value in one of these three columns has the effect of scrolling through the 64K routing table until the desired GVCID is found. When this happens, all rows are affected because every row in the editor is a neighbor of the rows above and below it. The editor is not limited to only eight different GVCIDs. The editor is programmed to show only eight neighboring GVCIDs in the routing table.

To program the routing table to make a particular GVCID send a particular service to a port, select any row on the editor and set the Version, Spacecraft ID, and VCID to the appropriate values. Then, move the cursor to the Port column and press Return. Services will cycle in the label between several values, depending on which services are defined or available on that port. Possible services are None, No Service (No_Srv), VCDU, VCDU with annotation (VCDU+A), VCA, and VCA with annotation (VCA+A).

To find any GVCID that has been programmed with a port service, move the cursor to the top four PortX labels and press Return. If there is a GVCID with a routing service on that port, the table will scroll to it. If not, there will be no change.

When the Edit option on Select Routed is selected, the following subwindow for router setup appears. Initially, this window displays router setup for Version 1. Make sure that Version 2 and Port 1 are selected to view the correct routing setup. In this example, VCID No. 1 and 3 are routed to Service Processor input.

Router Setup

V	SCID	VCID	Port 1	Port 2	Port 3	Port 4
2	0x02A	0x01	No Srv	None__	None__	None__
2	0x02A	0x02	None__	None__	None__	None__
2	0x02A	0x03	No Srv	None__	None__	None__
2	0x02A	0x04	None__	None__	None__	None__
2	0x02A	0x05	None__	None__	None__	None__
2	0x02A	0x06	None__	None__	None__	None__
2	0x02A	0x07	None__	None__	None__	None__
2	0x02A	0x08	None__	None__	None__	None__

ESC-ESC to exit

Load: if the file name is set, this function will attempt to load the routing table. If the file name is empty, a select menu will appear showing the available files in the data directory. If there are any routing services, the respective ports on the fixed services list will show Table.

Clear: button brings up a sub-window appears asking if the routing table should be cleared. If Y is pressed, the routing table, file name, and any Table serviced ports will be cleared.

Save: saves current routing table in the defined file name.

VCID Status: simple table that defines which of 12 VCIDs are to be counted and displayed on the Status screen. For ETS low-rate setup, set VCIDs 1, 2, 3, 4, 5, and 6, and set all to Version 2 frames.

3.2.2.3 VME Columns

The two VME output columns define the two standard output channels. Each output channel has a data source (Nascom block processor's NTLM output, or one of the Frame Server's four output ports) and a destination. To set up the output channel, move the cursor to the position across from the data source and press Return. If the selected input is defined to be sending data, a menu will appear. Menu options can include:

Not Enabled: disables output channel.

Mailbox: sets channel to output to a Modular Environment for Data Systems (MEDS) mailbox, and brings up a form window to set the details of the mailbox: mailbox card, name, driver (CPU/DMA), and number of frames per block.

Zippy: sets channel to output to a MEDS Zippy Box, and brings up a form window to set the details of the Zippy box: RAM name, driver (CPU/DMA), and number of frames per block.

Serial: routes output to a serial line (through InputMux), so there can only be one channel using this (it can not be used if InputMux is using it). The software will bring this menu item up if it would be illegal to use it.

After setting the output channel, the entry will have a text description of the type of output selected. If another entry is set on the same column, the previous entry will be cleared.

3.2.2.4 Output HRTB

The Output HRTB column is simple. Like the Output VME columns, the position of the entry defines which source of data is being sent to the HRTB, and the text description of the entry describes where data is to be sent. Unlike the Output VME columns, all HRTB entries can be set at the same time, providing that one of the HRTB channels is not being used for the data source into the FEP Card. In that case, that one HRTB output entry would not accept an input setting.

Channel numbers are fixed in hardware to the various subsystems. To set an output, move the cursor to the corresponding entry and press Return. A menu will appear that allows the entry to be set or cleared. For ETS low-rate setup, select HRTB 0 across from Port 1.

3.2.3 EOS SERVICE PROCESSOR CARD SETUP

Two setup screens are associated with EOS Service Processor setup. Setup 1 is displayed as follows:

```
                              SERVICE PROCESSOR

raw frame length, bytes  256_          Frame Error Control Word? No
frame sync pattern size 4              Operation Control Field?  No
FS trailer size 8_                     Secondary header? YES length 8_
RS trailer size 32_
output fill pattern   $C9              Delete bad packets? Yes_
frame version number   2
packet version number  1               1=reject, 0=process
                                       0 frames: RS/CRC errors at start
RS encoded? NO_   RS decoded? NO_      of session
RS interleave depth 0                  0 frames: wrong spacecraft id
                                       0 frames: wrong frame version
1=delete frame, 0=reject frame         0 packets: wrong packet version
0 frames with invalid vcid
0 frames with CRC or RS errors or      Number of Sources 0__
    invalid 1st header pointer         Error tagging on? NO_
                                       Packet Annotation 0
RS Header Encoding? NO_                0=No annotation/1=FAST annotation
Insert Zone? NO_ length 0__

Use the RETURN key and arrow keys to move around the page.
Next-page ^V, F4, PF4
Prev-pageESC-V, F3, PF3    Exit ^G, ESC-C, ESC-ESC
```

Fields are defined as follows:

Raw Frame Length, Bytes: for ETS low rate, frame length is 256 bytes.

Frame Sync Pattern Size: pattern size should be 4 bytes.

FS Trailer Size: indicate number of bytes to be included in the annotation field that the FEP will pass to the EOS Service Processor regarding frame synchronization status. The select size should be 8 or 10 bytes (if timecode is appended).

RS Trailer Size: indicate number of bytes to be included in the annotation field that the FEP will pass to the EOS Service Processor regarding Reed-Solomon decoding status. The select size should be 32 bytes.

Output Fill Pattern: selected value should be $C9.

Frame Version Number: for ETS, Version 2 is selected.

Packet Version Number: for ETS, Version 1 is selected.

RS Encoded: specify No.

RS Decoded: specify No.

RS Interleave Depth: for ETS, interleave depth 1 is selected for a frame size of 256 bytes. Interleave depth of 4 is selected for a frame size of 1024 bytes.

RS Header Encoding: for ETS, specify No.

Insert Zone: for ETS, specify No.

Insert Length: for ETS, leave field as 0.

Frame Error Control Word:

Operation Control Field:

Secondary Header: if secondary header is to be verified, specify length of 8 bytes.

Delete Bad Packets: specify required action by EOS Service Processor if bad packets are detected.

Number of Sources: value maintains number of sources to be processed. Source is identified for processing by VCID and APID.

Error Tagging On: for ETS, specify No.

Packet Annotation: for ETS, specify No.

Screen 2 of EOS Service Processor Card setup defines how input frames are processed. The user can modify the following fields: Number, APID, SPID, VCID, Packet Length, Flags, Increment. The Route field is not used for ETS. If this table is blank (all zeros listed under GVCID/Ports titles), the card will not output data.

```
              SV1                                        TUE JUL 23 13:28:30 1996
*Save   *Page Forward  *Page Back                        SOURCE SETUP
 Num Apid  Vcid1     Vcid0     Spid Pktlen Flags Inc Route  *VCID0 and 1 are bit
 0__ 0___ 00000000 00000000  0___ 0____  ____  0__  0__    masks. Vcid1 is for
   1    1 00000000 00000002    42  1664  ARNW   1    0     VC 0-31, Vcid2 is
   2    2 00000000 00000004    42   208  ADNW   1    0     for VC 32-63.
   3    3 00000000 00000008    42  1664  ARNW   1    0    *PKTLEN is the max
   4    4 00000000 00000010    42   208  ADNW   1    0     packet length.
   5    5 00000000 00000020    42   208  ADNW   1    0    *FLAGS
   6    6 00000000 00000040    42   208  ADNW   1    0     A=Active, D=DMA
   7    0 00000000 00000000     0     0  N      0    0     H=HRTB R=Real Time
   8    0 00000000 00000000     0     0  N      0    0     W=CLCW
   9    0 00000000 00000000     0     0  N      0    0     AOS Services
  10    0 00000000 00000000     0     0  N      0    0     N=Path, V=VCDU,
  11    0 00000000 00000000     0     0  N      0    0     C=VCA, B=Bitstream,
  12    0 00000000 00000000     0     0  N      0    0     E=Encapsulation.
  13    0 00000000 00000000     0     0  N      0    0    *INC is the packet
  14    0 00000000 00000000     0     0  N      0    0     sequence count.
  15    0 00000000 00000000     0     0  N      0    0     increment number
  16    0 00000000 00000000     0     0  N      0    0    *ROUTE is for the
  17    0 00000000 00000000     0     0  N      0    0     AFES(ACS) system
Use the RETURN key and arrow keys to move around the page.
Next-page ^V,F4,PF4
Prev-page ESC-V,F3,PF3                      Exit ^G,ESC-C,ESC-ESC
```

The EOS Service Processor Card is configured for two separate output buffers, which are identified as Real-time (R) and Direct Memory Access (D) for rate-buffered data. Once entries are made, the routing table lists the frame VCID, associated APID, and required services in the Flags column.

Number: identifies entry in the routing table. The routing table is set up with multiple columns. Each row represents an entry in the table; each entry is identified by the left-most number of the row. The Number field represents the left-most number, and allows the operator to identify, save, and change entries in the table. For example, if the operator enters 5, fills in APID, SCID, VCID, Packet Length, Service Flags, Packet Sequence Count, and then enters Save It, the routing table entry number 05 changes to those values just defined.

SCID: defines frame spacecraft identifier of the entry made into that number in the routing table. Provide the number in hexadecimal. For ETS, the SCID is 42.

VCID: define bit mask for identified virtual channel identifier. Only one VCID can be entered with each number entry.

***Save**: enters number entry into that catalog setup and saves entry to the routing table. To implement *Save, position the cursor over the star and press Enter. Unless *Save is implemented, setup information does not become part of EOS Service Processor Card setup, which is reflected by its lack of presence in the routing table.

3.2.4 FORWARD LINK INTERFACE CARD SETUP

The following screen is associated with FLIC setup:

```
        FL1: SPACECRAFT FORWARD LINK INTERFACE SETUP    WED JUN 19 22:28:46 1996
                                                        v  ''
         ----------------------------------------------------------------------
Command Ports Enabled                  Internal Clock Frequencies
      Telecom:  Enable                 Output (MHz):  .002
      Nascom:   Disable                Crystal (MHz):25.0
      AOS:      Disable
      D/C/E:    Disable                Idle (ON?OFF): On
      Echo:     Disable                Idle Pattern (00, FF, 55, AA) : 55

Data Mode:   Throughput                J3 Timecode:          Enable

Clock Select: Internal                 Input Data Type:      MEDS
                                       DDD Header:           No
PB1 Fill (hex): AA                     Send Response:        No
Parity Bit 0:    1                     Flush/Send:           Flush
Parity Bit 1:    1                     Network Timeout:      0__(secs)

Acq. Seq. Length (0-4095): 132         Codeblock Length (4-7 bytes) : 7
                                       (Note:length is always 1 byte greater than
                                       input value due to parity byte at end.)

 Use the RETURN key and arrow keys to move around the page.
 Exit ^G, ESC-C, ESC-ESC
```

FLIC setup fields are defined as follows:

Command Ports Enabled: used to determine to which ports the card will output, and from which ports the card will receive input. Each option is followed by a setup field that toggles between enable and disable, where an enable entry turns that port on to receive or output data. Options are defined as follows:

Telecom: serial uplink for telecommand data that can be via the front panel or P2, depending on jumper setup. For ETS LRS applications, card is jumpered so that this port is via P2 connector.

Nascom: currently not implemented in ETS LRS. Nascom is a serial output port for Nascom blocks. It can be via the front panel or P2, depending on card jumpering.

AOS: currently not implemented in ETS LRS. It can be via the front panel or P2, depending on card jumpering.

D/C/E: P2 only. Serial output port specifically designed to support the Advanced Composition Explorer (ACE) mission, which required that an enable signal accompany data and clock for telecommand data uplink. If this port is used, data is input to a command buffer unit that subsequently uplinks telecommand to the spacecraft.

Echo: only applicable if Telecom port is enabled. It is a P2 connector used for verification of spacecraft command uplink—the command is sent to a spacecraft via RF Ground Support Equipment (GSE), which echos the telecommand back to the card. The FLIC transfers the echo to a network connection (port) that is defined in a configuration file.

Data Mode: defines card's primary mode of operation; toggles between throughput and encode. Throughput passes through a telecommand without alteration. Encode mode is used when the FLIC's input is raw data; it encodes data so that it conforms to CCSDS CLTU format prior to uplink. For current ETS LRS applications, the card always operates in throughput mode.

Clock Select: defines source of clock that is driving data as internal or external. For ETS LRS, field always indicates internal, meaning that it uses the onboard Numerically Controlled Oscillator (NCO) to provide clock.

Internal Clock Frequencies: allows operator to set up clock output frequency; card's maximum capability is 10 kHz. Crystal (MHz) should be set to 25.

Idle: setup determines if an idle pattern is output after the first CLTU is uplinked through the card. Field toggles between Yes and No. If Yes, the defined idle pattern is output after the first CLTU uplink until the card is shut down. If No, no idle pattern is output.

Idle Pattern: defines idle pattern that is output if Idle is set to Yes. Options are: 00 11, AA, and 55.

J3 Timecode: allows operator to disable or enable FLIC J3 pipeline timecode output. Field toggles between enable and disable.

PB1 Fill: defines hex byte pattern used to fill a dummy register on the card. The value entered does not affect processing; use the default value aa.

Parity Bit 0: value does not affect ETS LRS processing; use the default value 1.

Parity Bit 1: value does not affect ETS LRS processing; use the default value 1.

Acq. Seq. Length (0 - 4095): defines number of bits prepended to data; its pattern is alternating 0's and 1's, starting with 0. The default value is 132, but the field can be changed to reflect applicable mission requirements.

Input Data Type: defines card's expected input data format. Field toggles between Nascom and MEDS. If Nascom, expected input is Nascom blocks, with or without a DDD header, depending on DDD header setup. If MEDS, expected input is data with a MEDS header. For current ETS LRS applications, field is always MEDS.

DDD Header: applies only when input data type is Nascom (developed to support Deep Space Network [DSN] DDD header). Field toggles between Yes and No. Yes indicates input Nascom block includes a DDD header; no indicates input block does not include a DDD header.

Send Response: MEDS data returns a MEDS header; Nascom data returns a Nascom block with the source and destination values swapped from the received format. If the Nascom block includes a DDD header, the response is the block and header source, and destination swapped in both.

Flush/Send: applies only when input data type is Nascom.

Network Timeout: works in conjunction with Flush/Send, and applies only when input data type is Nascom. Defines amount of time that FLIC waits between input blocks that contain CLTU before the Flush or Send is implemented. A value of 0 means wait forever.

Codeblock Length (4-7 bytes): data-dependent field that defines the format of the CLTU data field. The correct value is defined by the mission the card is supporting. In throughput mode, value is required to determine tail length; in encode mode, value is required to correctly encode data.

3.2.5 COMMAND BLOCK PROCESSOR SETUP

The following screen is associated with Command Block Processor setup:

```
 CBP      MC Command Block  Processor  Setup

--------------------------------------------------------------------------------
  Command Data Block Queue                    CDS Network Setup
------------------------                      -----------------
  Command Data Block Length      16384_____   IP Name
  Number of Command Data Blocks  20________   ets-gsf1____________________________
                                              IP Number
  Ground Message Header Specifications        198.118.197.93______________________
------------------------------------          Good Port Number  Bad Port Number
  Message Type/Test Message Type 131          3015 _____        3010 ______
  Source Identification          4__
  Destination Identification     1__
  [EDOS Software Version Number]              EOC Network Setup
  Major EDOS Release             1__          -----------------
  Version of Major Release       1__          Port Number to Receive Data On
                                              3020 __________
  Enable/Disable Effects         2
  1 = CBP, 2 = EDU,
  3 = Both CBP and EDU


  Use the RETURN key and arrow keys to move around the page.
  Exit ^G, ESC-C, ESC-ESC
```

Fields are defined as follows:

Command Data Block Queue:

Command Data Block Length: **16384 (**entry should be between 16384 and 65536**)**

Number of Command Data Block: **20 (**entry should be between 20 and 80**)**

IP Name: specify the name of the host.

IP Number: specify the IP address of the host.

Good Port Number: specify the port number for receiving CDBs that pass validation.

Bad Port Number: specify the port number for receiving CDBs that fail the validation.

Ground Message Header (GMH) Specification:

Message Type/Test Message Type: indicate value of the message type in the Ground Message Header (GMH).

Source Identification: indicate source identification number in the GMH.

Destination Identification: indicate destination identification number in the GMH.

EDOS Software Version Number:

Major EDOS Release: indicate major release number of software in the GMH.

Version of Major Release: indicate version number of software release in the GMH.

EOC Network Setup

Port Number to Receive Data On: specify the UDP port number for receiving CDBs from EOC.

```
                CBP     MC Command Block Processor EDU Setup  19 22:30:25 1996

-------------------------------------------------------------------------------
  Base Address of Transfer Memory (Hex): 80100000

  Non Real-Time EDU Transfer Setup
 --------------------------------
  NR-T EDU Transfer On: YES
  IP Address (Dotted Decimal): 128.183.247.59__
  Port Number: 5001_

  Real-Time EDU Transfer Setup
  ----------------------------
        Yes/No      IP Address                Port Number
        ------      ----------                -----------
  RT1   YES         128.183.247.59_           5000_
  RT2   NO_         _______________           5010_
  RT3   NO_         _______________           5020_
  RT4   NO_         _______________           5030_
  RT5   NO_         _______________           5040_

  Use the RETURN key and arrow keys to move around the page.
  Exit ^G, ESC-C, ESC-ESC
```

Fields are defined as follows:

Base Address of Transfer Memory: **s**pecify base pointer (e.g., 80100000) for record buffer where EOS Service Processor and EDU task get rate-buffered data and real-time data.

Non Real-Time EDU Transfer Setup:

Non R/T EDU Transfer On: indicate whether the transfer of rate-buffered data is On.

IP Address: specify IP address of destination server.

Port Number: specify port number (e.g., 5001) for data transfer.

Real-Time EDU Transfer Setup:

R/T 1: indicate whether transfer of real-time channel 1 is On.

IP Address: specify IP address of destination server receiving realtime data.

Port Number: specify port number (e.g., 5000) for data transfer.

R/T 2: indicate whether transfer of real-time channel 2 is On.

IP Address: specify IP address of destination server receiving realtime data.

Port Number: specify port number (e.g., 5010) for data transfer.

Note: Use port number 5020 for RT3, port number 5030 for RT4, and port number 5040 for RT5.

3.3 STATUS SCREENS

3.3.1 ACCESS STATUS SCREENS

When the Page command is selected from the OPMAN Main Menu, the following Pages Menu screen appears:

```
                        === PAGES ===  Press ^G    to exit.

Help           HELP Information
Cards          Cards
System         Subsystems Status
Network        Network Status
ESSTATUS       EOS Simulator Subsystem Status
SVSTATUS       SV Status
SV2STAT        SV EOS Status
SVVCSUMM       SV VC Summary
SVSRCSTA       SV Source Status
SVEOSSTAT      SV EOS Trigger Status
FPSTAT1        FEP Stat 1
FPSTAT2        FEP Stat 2
TBPSTATEOS     TBP Status
BPSTATUS       CBP Status
```

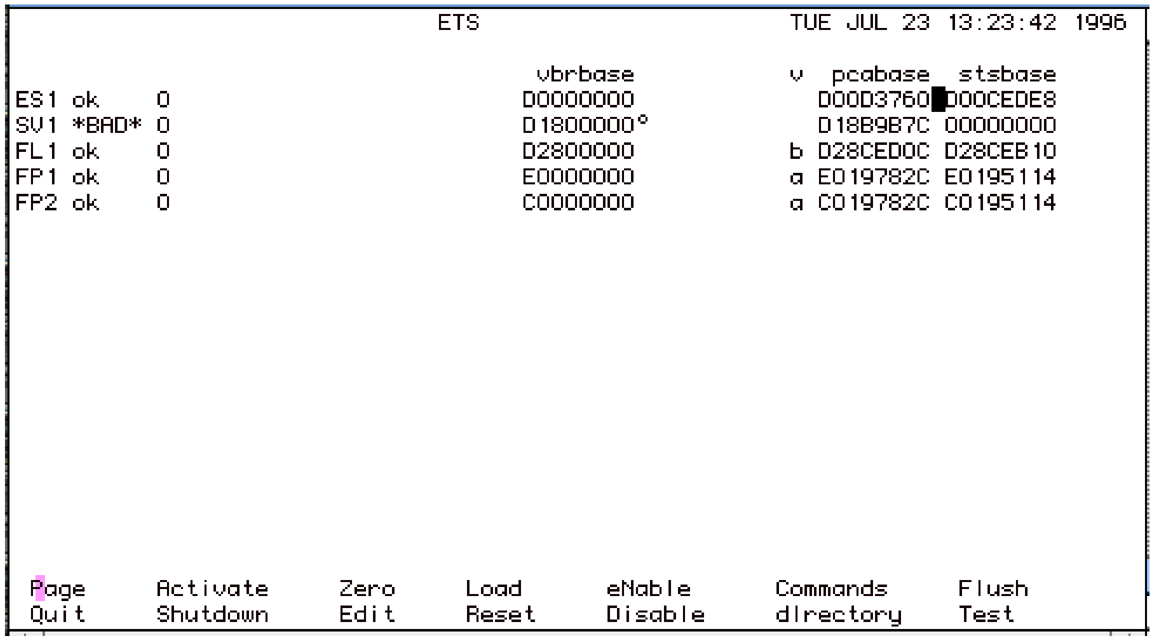
From this screen, the operator can access Help and specific Status Pages. Status Pages include system health information, an ETS LRS summary page for system-level status, and individual card status pages, each delineated by an appropriate name.

3.3.2 HELP

The Help Page returns the user to the OPMAN Help Menu.

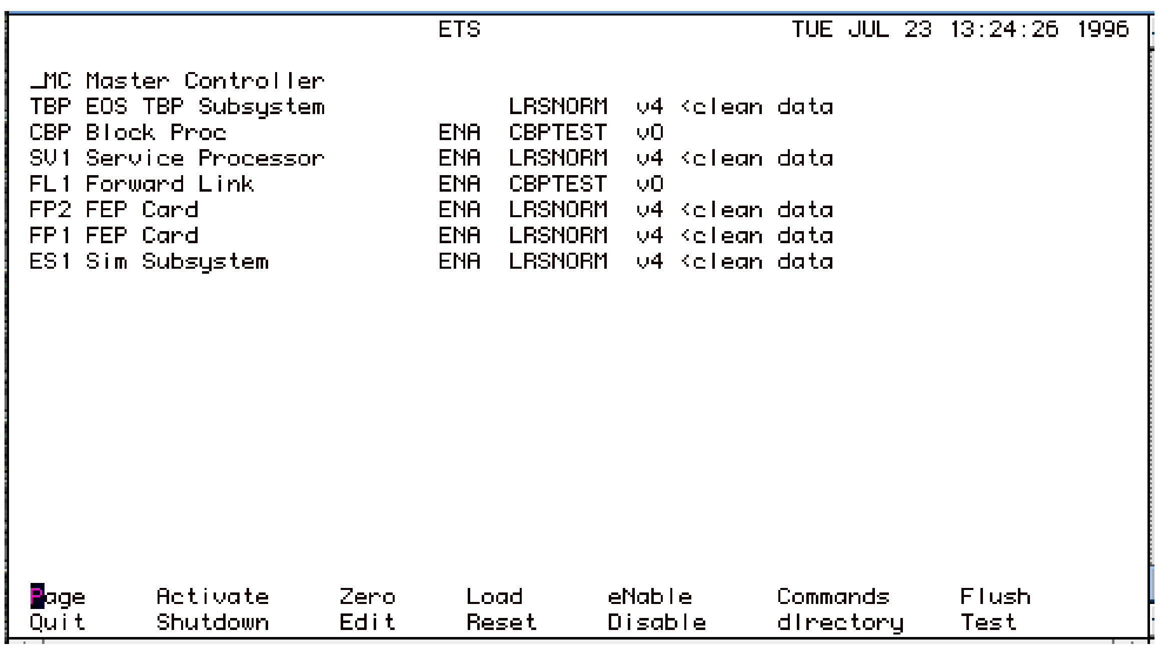
3.3.3 CARDS

The Cards Page consists of the following software status: base address for each card (vbrbase); date that software was compiled; version of software; global parameter card base address (pcabase) on VMEbus; and global status base address (stsbase) on VMEbus.



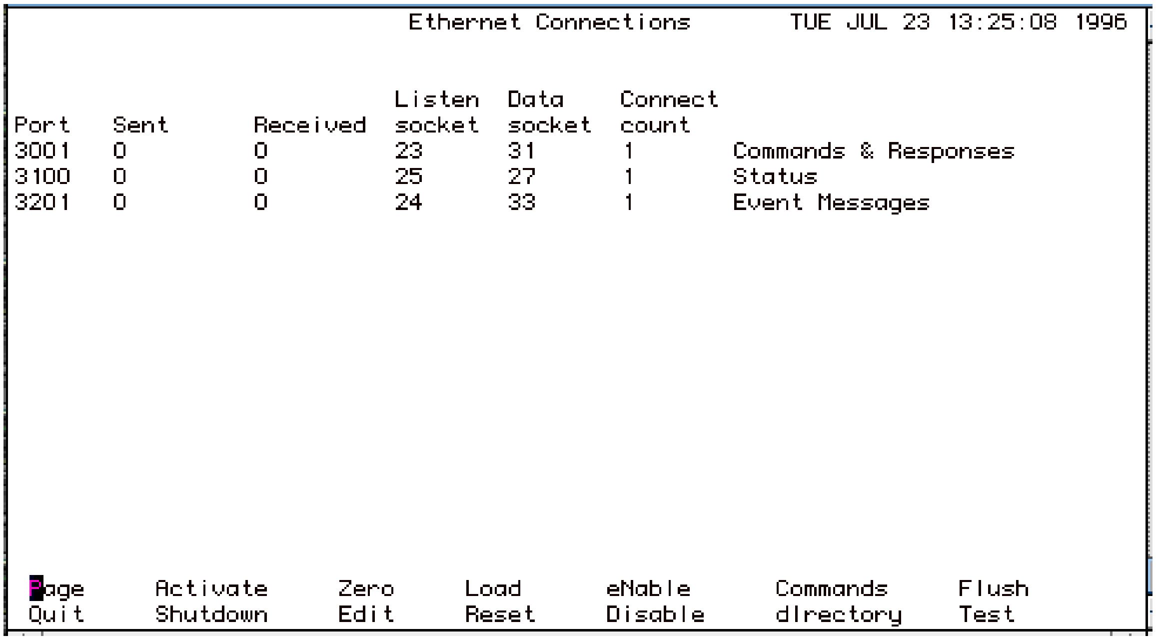
3.3.4 SYSTEM

The System Status Page lists each ETS LRS subsystem, status, file name used to enable (ENA) each subsystem, and a description of the file. No file is displayed for a disabled (DSB) subsystem. Any card or subsystem errors are reported on this page.



3.3.5 NETWORK STATUS

The Network Status Page lists activities associated with socket and port connections. Port is assigned to each known task connection (e.g., Port 3001 is used for commands an responses); therefore, the user can quickly identify the health of each port.



```
                              Ethernet Connections      TUE JUL 23 13:25:08 1996


                             Listen  Data    Connect
Port   Sent       Received   socket  socket  count
3001   0          0          23      31      1       Commands & Responses
3100   0          0          25      27      1       Status
3201   0          0          24      33      1       Event Messages











 Page     Activate     Zero     Load     eNable     Commands     Flush
 Quit     Shutdown     Edit     Reset    Disable    dIrectory    Test
```

3.3.6 EOS SIMULATOR CARD STATUS

The EOS Simulator Card Status page overviews status information for the card.

```
EOS Simulator Card STATUS page
-------------------------------------------------------------------------------
LRS Catalog:[clean data at 512KHz       Health:ok     [0    ]     Enabled? YES


DATA FILE SET                        Simulator board REV .....>A
   Base File Name.......>/ets/data/lrsclean.cadu
   Frame Size...........>256            Number of frames.....>14000
   Update..>NO   ByScsi.>NO             Total Memory Size....>2    MB

SIMULATOR STATUS
   RS422 to the card....>FEB        ClockMode..>Cont     Frq.>.512     MHZ
   Running Mode.........>Number of transfers :          14002
   Frame Output Mode....>FT         Output Frame Count.......>14002
   CRC...>NO       RS...>NO         BTD...>NO    Interleave..>1
   Slip function........>NO
   Frame num injected...>0              FrameEnum injected..>0
   GaiN/LoSt ...........>NA             GaiN/LoSt ..........>NA
   slip bits ...........>0              slip bits ..........>0
   Byte position........>0              Byte position.......>0

ESCOM seconds counter....>1525

Use the RETURN key and arrow keys to move around the page.
Next-page ^V, F4, PF4
Prev-pageESC-V, F3, PF3     Exit ^G, ESC-C, ESC-ESC
```

Fields are defined as follows:

ES1 Catalog: name of catalog used to set up card.

Version of File: setup allows operator to create multiple versions of the same file. Version number indicates which version of the file is being used in the current processing.

Health: status of hardware during operation; may read Ok, Good, Bad, Dead, or Booting.

Enabled: indicates whether card is enabled or disabled (Yes/No). An enabled card is ready to process data; for the EOS Simulator Card, enabled indicates that card is outputting data.

DATA FILE SET:

Simulator Board REV: indicate hardware revision number of board.

Base File Name: name and path of data set file.

Frame Size: number of bytes in a frame.

Update Function: indicate whether the update function is exercised.

By SCSI: indicate if update function is via SCSI board. Not available in ETS-LRS.

Number of Frames: number of frames to be generated.

Total Memory Size: number of available bytes in memory.

SIMULATOR STATUS:

RS-422 to card: indicate selected output.

Clock Mode: indicate whether the clock is running continuously.

Frequency: indicate the selected output frequency.

Running Mode: indicate whether card is generating data or stopping.

Frame Output Mode: indicate whether data is generated in forward, reverse, true, etc.

Output Frame Count: indicate number of frames are being sent.

CRC: indicate if CRC encoding scheme is used.

RS: indicate if Reed-Solomon encoding scheme is used.

BTD: indicate if bit transition density is selected.

Interleave: indicate Reed-Solomon interleave level.

Slip Function: indicate No if no slip function is selected; Yes if either one of two slip functions is selected.

Slip Function No. 1

Frame_num Injected: indicate which frame number relative to 4 M of memory slip occurs.

GaiN/LoSt Bits: indicate GN if gain is detected; LS if loss bit is detected in Slip No. 1 function.

Slip Bit Number: indicate 0, 1, 2, or 3 depending on number of bit slip(s) detected.

Byte Position: indicate which byte in frame slip bit is detected.

Slip Function No. 2

Frame_Num Injected: indicate which frame number relative to 4 M of memory slip occurs.

GaiN/LoSt Bits: indicate GN if gain is detected; LS if loss bit is detected in Slip No. 2 function.

Slip Bit Number: indicate 0, 1, 2, or 3 depending on number of bit slip(s) detected.

Byte Position: indicate which byte in frame slip bit is detected.

ESCOM Seconds Counter: indicates number of seconds elapsed.

3.3.7 FEP CARD STATUS PAGES

Two screens are associated with FEP Card status. FEP Status Page 1 reflects the high-level processing of subsystems in card.

```
FEP Status Page 1

-------------------------------------------------------------------------------
FP1 Catalog:                            Health: ok    [0    ]     Enabled? NO

RS Front1  Input MUX  Data Rate         Spacecraft ID = 42
              |        =256.449 KHz                Day   Sec   mS  uS
              |                         First Lock :0     0     0   0
              |      TL=0               Last Lock  :0     0     0   0
              |      NT=0               Sync Mode  :Search
              |
          Frm Synch  In=14002
              |                                    -> VME 1  :12800
              |                     Sent:0          Dropped 0
          Frm Annot  In=14000       Disabled       -> VME 2  :14000
              |                     Sent:0          Dropped 0
              |                     Table          -> HRTB 0 :12800
          RS Decode  In=14000                      -> HRTB 1 :0
              |                                    -> HRTB 2 :0
              |                                    -> HRTB 3 :0
          Frm Serve  In=14000                      -> HRTB 4 :0
              |                                    -> HRTB 5 :0


Use the RETURN key and arrow keys to move around the page.
Next-page ^V, F4, PF4
Prev-pageESC-V, F3, PF3     Exit ^G, ESC-C, ESC-ESC
```

Fields are defined as follows:

Catalog: name of catalog that provided setup parameters for current data processing.

Health: displays hardware status; field reads Ok, Good, Bad, Dead, or Booting. Booting indicates card-level hardware reset that is not yet complete. Bad indicates an error in FEP Card processing. Usually, a Dead card requires a hardware reset before it can continue correct processing.

Enabled: indicates whether card is ready to process data (enabled = ready).

RS-Front 1: displays input port with which card is set up to process data.

Data Rate: displays incoming data rate.

Spacecraft ID: indicate the ID of spacecraft being serviced.

First Lock: indicate the time and date of first lock frame for the session.

Last Lock: indicate the time and date of last lock frame for the session.

Frm Synch In: value maintains a count of the total number of input frames recognized by the FEP Card.

Frm Annot: value maintains a count of the total number of input frames annotated by the FEP Card.

RS Decode: value maintains a count of the total number of input frames decoded by the FEP Reed-Solomon circuitry.

Frm Serve: value maintains a count of the total number of input frames passed through the Frame Server function.

VME 1: value maintains a count of the total number of output frames passed through VMEbus No. 1.

Sent: value maintains a count of the total number of frames sent through VMEbus No. 1.

Dropped: value maintains a count of the total number of dropped frames passed to VMEbus No. 1.

VME 2: value maintains a count of the total number of output frames passed through VMEbus No. 2.

Sent: value maintains a count of the total number of frames sent through VMEbus No. 2.

Dropped: value maintains a count of the total number of dropped frames passed to VMEbus No. 2.

FEP Status Page 2 reflects detailed statistics on the frame synchronization, Reed-Solomon, and Frame Service functions.

```
                               FEP Status Page 2       TUE JUL 23 13:16:32 1996
-------------------------------------------------------------------------------
FP1 Catalog: LRSNORM  v4                 Health: ok     [0     ]     Enabled? YES
    <clean data
  Frame Sync                   Reed Solomon             Frame Service
Frames In    0           Input Frm     0           Frame Count 65536
Frames Out   0           Long Frm      0
Good Syncs   0           Short Frm     0          VCID V Count        Seq Err
Search       65536       Filter Frm    0            1   2 7168        0
Check        0           Corr Frm      0            3   2 7168        0
Lock         2           Uncorr Frm    0            0   2 0           0
Flywheel     0           Unroute Frm   0            0   2 0           0
B2Search     65536       Corr Hdr      0            0   2 0           0
Forward CRC  0           Uncorr Hdr    0            0   2 0           0
Reverse CRC  0           Corr Cdw      0            0   2 0           0
Blocks In    0           Uncorr Cdw    0            0   2 0           0
Poly Err     0           Corr Frm Err  0            0   2 0           0
Slip Frm     0           Corr Hdr Err  0            0   2 0           0
FrmSync Err  0           Corr Bit Err  0            0   2 0           0
Current      Inv-Rev                                0   2 0           0

 Page     Activate     Zero     Load     eNable     Commands     Flush
 Quit     Shutdown     Edit     Reset    Disable    dIrectory    Test
```

Fields are defined as follows:

Catalog: system catalog name that was enabled when this status information was generated.

Health: status of hardware during operation; may read Ok, Good, Bad, Dead, or Booting.

Enabled: indicate if card is ready to process data (Yes/No).

FRAME SYNC

Frames In: value maintains a count of the number of frames recognized by the card.

Frames Out: value maintains a count of the number of frames output from the card. Depending on setup information, the card may output only lock frames, only check and lock frames, or all frames.

Good Syncs: total number of frames input to the Reed-Solomon Card.

Search Frames: maintains a count of frames processed in search mode. The number of frames processed in search mode is completely dependent on the setup of the card's search, check, and lock logic and the corresponding bit error tolerances. However, for the typical setup, if no errors occur in the input data, only one search frame is reported.

Check Frames: maintains a count of frames processed in check mode. The number of frames processed in check mode is completely dependent on the setup of the card's search, check, and lock logic and the corresponding bit error tolerances. However, for the typical setup, and if no errors occur in the data, this value is between 0 and 15.

Lock Frames: maintains a count of frames processed in lock mode. The number of frames processed in lock mode is completely dependent on the setup of the card's search, check, and lock logic and the corresponding bit error tolerances. However, if no errors occur in the input data, once the logic has moved into lock mode, it stays in lock mode. Therefore, for error-free data, once this value starts to increment, it should continue to increment without the Search Frames or Check Frames values incrementing.

Flywheels: total number of flywheel frames detected. Flywheel frames are frames detected in lock mode with more bit errors than the set tolerance permits.

B2 Search: value is the number of times card switched from lock to search mode.

Fwd CRC: field is valid with forward data; displays number of detected frames with CRC errors. The field is applicable only if the card is set up to check CRC. If the card checks CRC values, it calculates a frame CRC based on the data input and compares it to the expected CRC value that is supplied in the frame trailer; if the two values do not match, a CRC error is recorded.

Reverse CRC: field is valid with reverse data; displays number of CRC errors that occurred. The same criteria determines a Rev CRC Err as determines a Fwd CRC Err; the only difference is that it is reverse data that is under examination.

Blocks In: maintains a count of the number of Nascom blocks recognized by the card.

Poly Err: number of frames processed with a long or short bit slip (frame was longer or shorter than expected length). If the FEP Card is not set up with a slip tolerance, frames that are too long or too short are not detected. If a slip tolerance is set, the card can only detect bit slips (long or short) that are less than or equal to the set tolerance.

Slip Frm: number of frames processed with a long or short bit slip (frame was longer or shorter than expected length). If the FEP Card is not set up with a slip tolerance, frames that are too long or too short are not detected. If a slip tolerance is set, the card can only detect bit slips (long or short) that are less than or equal to the set tolerance.

FrmSync Err: displays number of detected frames with synchronization pattern errors. If card is not set up with a frame synchronization pattern bit error tolerance, frames with a synchronization pattern error will not be detected. If a synchronization pattern bit error tolerance is set, the card can only detect frames with synchronization pattern bit errors less than or equal to the set tolerance.

Current: displays whether detected frames are in true, reverse, inverse.

REED-SOLOMON

Input Frm: displays hexadecimal header of last Nascom block input to the Synchronizer Card.

Long Frm: number of frames input to the Reed-Solomon Card that were longer than expected length. Expected length is defined in card setup.

Short Frm: number of frames input to the Reed-Solomon Card that were shorter than expected length. Expected length is defined in card setup.

Filter Frm: count of frames that Reed-Solomon circuitry received as input, but did not output.

Corr Frm: count reports number of frame headers in which card detected errors, and was able to correct.

Uncorr Frm: count of frames in which Reed-Solomon circuitry detected errors, but was not able to correct all.

Unroute Frm: count of frames that Reed-Solomon Card received as input, but did not output.

Corr Hdr: count reports number of header errors both detected and corrected by the card. This field is not applicable in passthrough mode. More than one error can occur in the same frame header; therefore, this field does not reflect the number of frames with header errors. For that value, refer to Headers Corrected field.

Uncorr Hdr: count reports number of frame headers with uncorrectable errors.

Corr Cdw: count reports number of codeword errors detected and corrected by the Reed-Solomon Card. This field is not applicable in passthrough mode. More than one error can occur in the same codeword; therefore, this field does not reflect the number of codewords with header errors. For that value, refer to Codewords Corrected field. **NOTE**: Frames with interleave greater than one have more than one codeword

Uncorr Cdw: count reports number of codewords with uncorrectable errors.

Corr Frm Err: count reports number of frames with detected errors (header or codeword) that were corrected.

Corr Hdr Err: count reports number of frames with detected errors (header) that were corrected.

Corr Bit Err: count reports number of frames with detected bit errors that were corrected.

FRAME SERVICE

Frame Count: total count of frames received by the Frame Service circuitry during the session. If all VCIDs are routed to EOS Service Processor, the total counts of all VCIDs should add up to this value.

VCID: indicate VCID channel(s) that is/are selected for routing.

Version: indicate version number of frames. For ETS, Version 2 should be expected.

Count: indicate number of frames processed for that particular VC.

Seq Err: total number of virtual channel sequence errors detected by the FEP Card. The card monitors the virtual channel sequence value in the frame header, and increments this count whenever a discontinuity occurs (for each virtual channel input).

3.3.8 TBP STATUS PAGE

The TBP Status Page indicates the configuration of the telemetry backplane. The S symbol indicates the source of data flow. The I symbol indicates the destination or data sink (input). The >> symbol indicates the flow of data from left to right (e.g., from FP1 to SV1).

```
                              TBP Status Page        TUE JUL 23 13:15:24 1996
------------------------------------------------------------------------------
TBP Catalog: LRSNORM  v4                 Health: *BAD* [-21  ]     Enabled? YES
    <clean data                          SV1: I/O timeout

                               FP1    FP2           SV1
     ___S1  ___S2  ___S3  ___S4  _M_S5  ___S6  ___S7  ___S8  ___S9  ___S10
     | |    | |    | |    | |    | |    | |    | |    | |    | |    | |
Ch 0 | +-||-+ +-----+ +-----+ +-||-+S+-----+ +-----+ +->>-+|+-----+ +-----+ | <<
     | |    | |    | |    | |    | |    | |    | |    | |    | |    | | driving
Ch 1 | +-----+ +-||-+ +-----+ +-----+ +-||-+ +-----+ +-----+ +-||-+ +-----+ | left
     | |    | |    | |    | |    | |    | |    | |    | |    | |    | |
Ch 2 | +-----+ +-----+ +-||-+ +-----+ +-----+ +-||-+ +-----+ +-----+ +-||-+ | ||
     | |    | |    | |    | |    | |    | |    | |    | |    | |    | | off
Ch 3 | +-||-+ +-----+ +-----+ +-||-+ +-----+ +-----+ +-||-+ +-----+ +-----+ |
     | |    | |    | |    | |    | |    | |    | |    | |    | |    | | >>
Ch 4 | +-----+ +-||-+ +-----+ +-----+ +-||-+ +-----+ +-----+ +-||-+ +-----+ | driving
     | |    | |    | |    | |    | |    | |    | |    | |    | |    | | right
Ch 5 | +-----+ +-----+ +-||-+ +-----+ +-----+ +-||-+ +-----+ +-----+ +-||-+ |
     |_|    |_|    |_|    |_|    |_|    |_|    |_|    |_|    |_|    |_|


  Page     Activate    Zero     Load     eNable     Commands    Flush
  Quit     Shutdown    Edit     Reset    Disable    dIrectory   Test
```

Fields are defined as follows:

Catalog: system catalog name that was enabled when this status information was generated.

Health: status of hardware during operation; may read Ok, Good, Bad, Dead, or Booting.

Enabled: indicates whether TBP is set to transmit data (Yes/No) from source to sink.

Channel: indicate port or channel number associated with the output port of the FEP Card.

S1-S10: identify slot number where each card is plugged into bus. Identified slots for source and sink should reflect the actual plug-in configuration.

3.3.9 COMMAND BLOCK PROCESSOR STATUS PAGE

There are two screens associated with Command Block Processor setup. The first setup page allows entries for command data block queue, ground message header specifications, and enable/disable effects.

```
        CBP     MC Command Block Processor Status WED JUN 19 22:30:25 1996

 CBP Catalog:                        Health: ok    [0    ]     Enabled? Yes


 EDOS Ground Message Header Settings     Statistics of Command Data Blocks
 -------------------------------         ------------------------------
 Message/Test Message Type     131             Total Good             50
 Source Identification         4
 Destination Identification    1               Number Received  with bad
                                                 Message Type         0
                                                 Source Id.           0
 EDOS Software Version Numbers                   Destination Id.      0
---------------------------                      Version Numbers      0
 Major Release                 1                 Sequence Count       0
 Version Number                1                 Message Length       0
                                                 Total Bad            0
 Network  Status
______________                                 Total Received         50
 CDS Good port is up.                          Drop Count             0
 CDS Bad pot is up.


  Page     Activate     Zero     Load     eNable     Commands     Flush
  Quit     Shutdown     Edit     Reset    Disable    dIrectory     Test
```

Fields are defined as follows:

Catalog: system catalog name that was enabled when this status information was generated.

Health: status of hardware during operation. Field may read Ok, Good, Bad, Dead, or Booting.

Enabled: indicates whether card is ready to process data (Yes/No).

EDOS Ground Message Header Settings

Message/Test Message Type: indicate valid value of the message type in the GMH.

Source Identification: indicate valid source identification number in the GMH.

Destination Identification: indicate valid destination identification number in the GMH.

EDOS Software Version Number:

Major Release: indicate major release number of software in the GMH.

Version Number: indicate version number of software release in the GMH.

Network Status

CDS Good port is: indicate whether port is UP (for data transmission) or DOWN.

CDS Bad port is: indicate whether port is UP (for data transmission) or DOWN.

Statistics of Command Data Blocks

Total Good: indicate total number of CDBs that passed validation.

Number Received with Bad: indicate total number of CDBs that failed validation.

Message Type: indicate total number of CDBs that failed message type validation.

Source Id: indicate total number of CDBs that failed source ID validation.

Destination Id: indicate total number of CDBs that failed destination ID validation.

Version Numbers: indicate total number of CDBs that failed valid version number validation.

Sequence Count: indicate total number of CDBs that failed sequence count validation.

Message Length: indicate total number of CDBs that failed message length validation.

Total Bad: indicate total numbers of CDBs that failed validation.

Total Received: indicate total numbers CDBs received from EOC.

Drop Count: indicate total number of CDBs that were dropped due to buffer overflow.

3.3.10 FORWARD LINK INTERFACE CARD STATUS PAGE

The FLIC Status Page reflects FLIC setup (refer to the FLIC Setup Page for details).

```
       Forward Link                      STATUS            THU FEB 23 14:29:03 1995
      -----------------------------------------------------------------------------
FL1 Catalog:FLDDD    Health: ok  {0  }     Enabled? YES
  test DDD header
Data Mode : Throughput               Clock Select : Internal

Command Output Port:                 Internal Clock Frequencie
      Telecom:                       Enable Output (MHz)   :.002
      Nascom:Disable                 Crystal (MHz)  :25.0
      AOS:    Disable
      D/C/E:  Disable                J3 Timecode : Enable
      Echo:   Disable

Transfer Status                      Hardware Counters
State : Idle                           Sync Count   : 5
Command Data Units In    : 5           Load Frame   : 4
Command Data Units Out   : 5           Frame Error  : 5
Command Data Units Echoed: 0           Good Frames  : 231

PB1 Time - 023 : 18 : 07 : 02
FLY Time - 023 : 18 : 07 : 02


 Page     Activate     Zero     Load     eNable     Commands     Flush
 Quit     Shutdown     Edit     Reset    Disable    dIrectory     Test
```

Fields are defined as follows:

Catalog: system catalog name that was enabled when this status information was generated.

Health: status of hardware during operation; may read Ok, Good, Bad, Dead, or Booting.

Enabled: indicates whether card is ready to process data (Yes/No).

Data Mode: provides card's primary mode of operation; throughput or encode. Mode is determined by card setup.

Command Ports Enabled: status provided beneath this field lists the ports enabled for telecommand input/output from the FLIC. Status reflects card setup. Each port is reported as Enable or Disable. Ports are: Telecom, Nascom, AOS, D/C/F, and Echo.

Transfer Status: each transfer status field reflects FLIC telecommand data I/O status.

State: reflects FLIC data processing. Idle indicates card is not processing any data input or output. Holding indicates telecommand data is input and is currently being processed. Sending indicates data processing is complete, and data is being output for uplink.

Command Data Units In: count of the number of CLTUs that card received for uplink.

Command Data Units Out: count of the number of CLTUs that card output for uplink.

Command Data Units Echoed: count of the number of command echoes received from the spacecraft. The field is only applicable if the card is correctly set up to receive echoes.

PB1 Time: reflects card's calculated PB1 time based on timecode input.

FLY Time: reflects card's flywheel time based on timecode input.

Clock Select: defines card's clock source, internal or external. This field reflects card setup.

Internal Clock Frequencies: Output (MHz): defines card's data output rate, which reflects card setup. Crystal (MHz) field provides card's onboard crystal frequency, which is a set value and can not be changed.

J3 Timecode: field is reported as Enable or Disable, and reflects card's setup. Status indicates whether timecode is being output from the FLIC to the J3 pipeline for use by the Synchronizer Card.

Hardware Counters: fields report value of specific hardware status registers.

Sync Count: count reports number of CLTU synchronization patterns recognized by FLIC hardware.

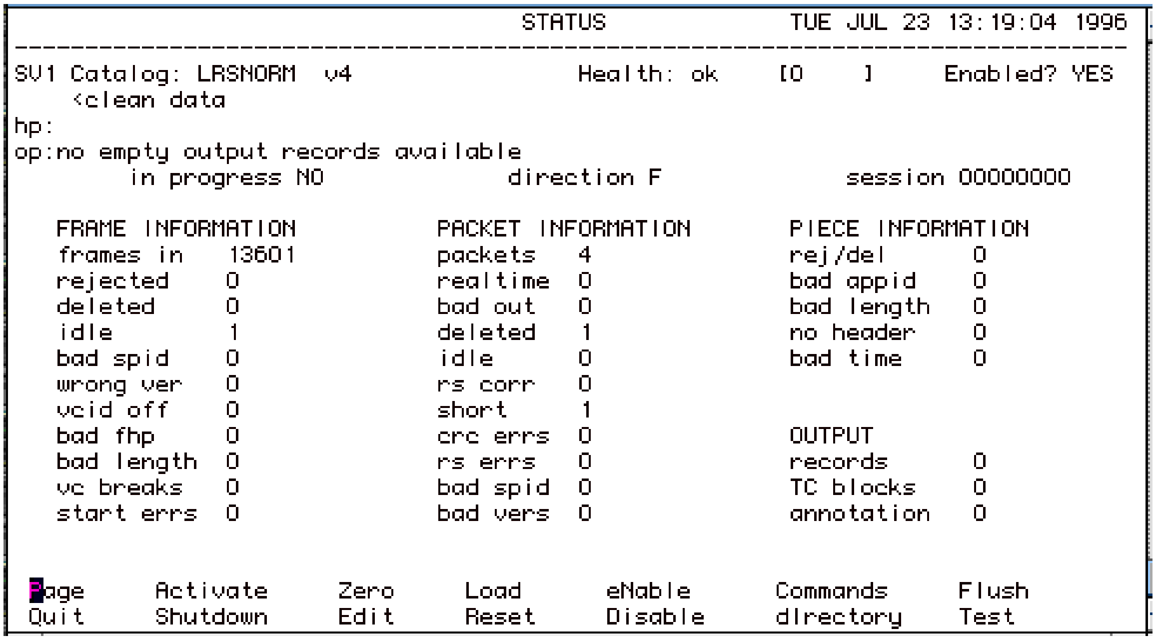
Load Frame: count reports number of times timecode was loaded into hardware registers.

Frame Error: count reflects number of bad timecode frames FLIC received.

Good Frames: count reflects number of good timecode frames FLIC received.

3.3.11 EOS SERVICE PROCESSOR STATUS PAGE

Five status screens are associated with the EOS Service Processor. The first page reflects high-level processing of the card.



```
                                     STATUS             TUE JUL 23 13:19:04 1996
------------------------------------------------------------------------------
SV1 Catalog: LRSNORM  v4                     Health: ok     [0     ]     Enabled? YES
    <clean data
hp:
op:no empty output records available
        in progress NO               direction F              session 00000000

   FRAME INFORMATION          PACKET INFORMATION       PIECE INFORMATION
   frames in    13601         packets    4             rej/del        0
   rejected     0             realtime   0             bad appid      0
   deleted      0             bad out    0             bad length     0
   idle         1             deleted    1             no header      0
   bad spid     0             idle       0             bad time       0
   wrong ver    0             rs corr    0
   vcid off     0             short      1
   bad fhp      0             crc errs   0             OUTPUT
   bad length   0             rs errs    0             records        0
   vc breaks    0             bad spid   0             TC blocks      0
   start errs   0             bad vers   0             annotation     0

 Page      Activate     Zero     Load     eNable     Commands     Flush
 Quit      Shutdown     Edit     Reset    Disable    dIrectory    Test
```

Fields are defined as follows:

Catalog: system catalog name that was enabled when this status information was generated.

Health: status of hardware during operation; may read Ok, Good, Bad, Dead, or Booting.

Enabled: indicate whether card is ready to process data (Yes/No).

FRAME INFORMATION:

Frames In: count of frames recognized by the card.

Rejected: count of rejected frames per annotated information from FEP(s). Packet processing can be performed by the EOS Service Processor.

Deleted: count of deleted frames per annotated information from FEP(s). Packet processing will not be performed by the EOS Service Processor.

Idle: count of idle frames recognized by FEP(s).

Bad SPID: count of frames with bad spacecraft identifier.

Wrong Ver: count of frames with incorrect version number. For ETS, frames with Version 2 are valid.

VCID Off: count of frames whose VCID is not identified in the processing catalog.

Bad FHP: count of frames with bad first header pointer.

Bad Length: count of frames with incorrect length.

VC Breaks: count of frames with sequence counts that are not contiguous.

Start Errs: count of frames with starting sequence counts not as expected.

PACKET INFORMATION:

Packets: count of valid packets recognized by the card.

Realtime: count of real-time packets recognized by the card.

Bad Out: count of packets recognized by the card as having invalid parameters.

Deleted: count of packets deleted from the output queue.

RS Corr: count of packets recognized by the card .

Short: count of packets shorter than expected length. Expected length is defined in card setup.

CRC Errs: number of packets embedded in frames with CRC errors.

RS Errs: number of packets embedded in frames with Reed-Solomon errors.

Bad SPID: number of packets embedded in frames with bad spacecraft identifiers.

Bad Vers: number of packets with incorrect version numbers.

PIECE INFORMATION:

Rej/Del: number of packets rejected or deleted by the card.

Bad APPID: number of packets with an invalid application process identifier.

Bad Length: number of packets shorter or longer than expected length. Expected length is defined in card setup.

No Header: number of packets unrecognizable by the card.

Bad Time: number of packets with invalid time fields.

OUTPUT

Records: value maintains number of records being transferred via DMA.

TC Blocks: not used for ETS.

Annotation: not used for ETS.

```
                                        STATUS              TUE JUL 23 13:19:39 1996
------------------------------------------------------------------------------------
SV1 Catalog: LRSNORM  v4                    Health: ok      [0     ]      Enabled? YES
    <clean data
   AOS SERVICES (other the Path Packet)
   VCDU           0
   VCA            0
   Bitstream      0
   Encapsulation  0
   Segmentation   0
   Insert         0











 Page      Activate     Zero     Load     eNable     Commands     Flush
 Quit      Shutdown     Edit     Reset    Disable    dIrectory    Test
```

Fields are defined as follows:

Catalog: system catalog name that was enabled when this status information was generated.

Health: status of hardware during operation; may read Ok, Good, Bad, Dead, or Booting.

Enabled: indicates whether card is ready to process data (Yes/No).

AOS Services (other than Path Packet):

VCDU: not used in ETS LRS.

VCA: not used in ETS LRS.

Bitstream: not used in ETS LRS.

Encapsulation: not used in ETS LRS.

Segmentation: not used in ETS LRS.

Insert: not used in ETS LRS.

```
VC SUMMARY             THU JAN 01 12:49:30 1970
-------------------------------------------------------------------------------
SV1 Catalog:                           Health: ok    [0     ]     Enabled? NO

         vc# 1    vc# 2    vc# 3    vc# 4    vc# 5    vc# 6    vc# 7    vc# 8
frames   6401     200      6400     200      200      200      0        0
reject   0        0        0        0        0        0        0        0
delete   0        0        0        0        0        0        0        0
idle     0        0        0        0        0        0        0        0
crc      0        0        0        0        0        0        0        0
clcwcnt  6401     200      6400     200      200      200      0        0
gaps     0        0        0        0        0        0        0        0
missing  0        0        0        0        0        0        0        0
rs-corr  0        0        0        0        0        0        0        0
rs-unc   0        0        0        0        0        0        0        0
rs-csym  0        0        0        0        0        0        0        0
idle-pk  0        0        0        0        0        0        0        0
idlbyte  0        0        0        0        0        0        0        0
VCDU     0        0        0        0        0        0        0        0
VCA      0        0        0        0        0        0        0        0
Bitstrm  0        0        0        0        0        0        0        0
```

Fields are defined as follows:

Catalog: system catalog name that was enabled when this status information was generated.

Health: status of hardware during operation; may read Ok, Good, Bad, Dead, or Booting.

Enabled: indicates whether card is ready to process data (Yes/No).

Frames: number of frames assigned with the associated VCID.

Reject: number of frames with the associated VCID that were rejected.

Delete: number of frames with the associated VCID that were deleted.

Idle: number of idle frames.

CRC: number of frames with the associated VCID that were detected with CRC errors.

CLCWcnt: number of frames with the associated VCID with incorrect CLCW sequence count.

Gaps: number of gaps associated with the VCID detected.

Missing: number of frames assigned with the associated VCID.

RS-corr: number of frame headers in which card detected errors, and was able to correct.

RS-unc: count of frames in which Reed-Solomon circuitry detected errors, but was not able to correct all.

RS-csym: count of symbols that Reed-Solomon circuitry was able to correct.

Idle-pk: not used in ETS LRS.

Idlbyte: number of bytes in idle packets.

VCDU: not used in ETS LRS.

VCA: not used in ETS LRS.

Bitstrm: not used in ETS LRS.

```
                                 SOURCE SUMMARY        TUE JUL 23 13:21:11 1996
--------------------------------------------------------------------------------
SV1 Catalog: LRSNORM  v4                 Health: ok    [0    ]     Enabled? YES
    <clean data

Indx VC-VC APID Service    Packets Crc/Rs-err     Padded     Deleted    Seq Errs
0001  1- 1    1    PATH          2          0          0           0           0
0002  2- 2    2    PATH          1          0          0           0           0
0003  3- 3    3    PATH          1          0          1           1           0
0004  4- 4    4    PATH          0          0          0           0           0
0005  5- 5    5    PATH          0          0          0           0           0
0006  6- 6    6    PATH          0          0          0           0           0
0007  0- 0    0    PATH          0          0          0           0           0
0008  0- 0    0    PATH          0          0          0           0           0
0009  0- 0    0    PATH          0          0          0           0           0
0010  0- 0    0    PATH          0          0          0           0           0
0011  0- 0    0    PATH          0          0          0           0           0
0012  0- 0    0    PATH          0          0          0           0           0
0013  0- 0    0    PATH          0          0          0           0           0
0014  0- 0    0    PATH          0          0          0           0           0


  Page     Activate    Zero    Load    eNable    Commands    Flush
  Quit     Shutdown    Edit    Reset   Disable   dIrectory   Test
```

Fields are defined as follows:

Catalog: system catalog name that was enabled when this status information was generated.

Health: status of hardware during operation; may read Ok, Good, Bad, Dead, or Booting.

Enabled: indicates whether card is ready to process data (Yes/No).

Indx: value should match number of items set up in processing catalog.

VC-VC: **i**dentify VCID associated with each index.

APID: value should match number of items set up in processing catalog.

Service: for ETS, only path service is required.

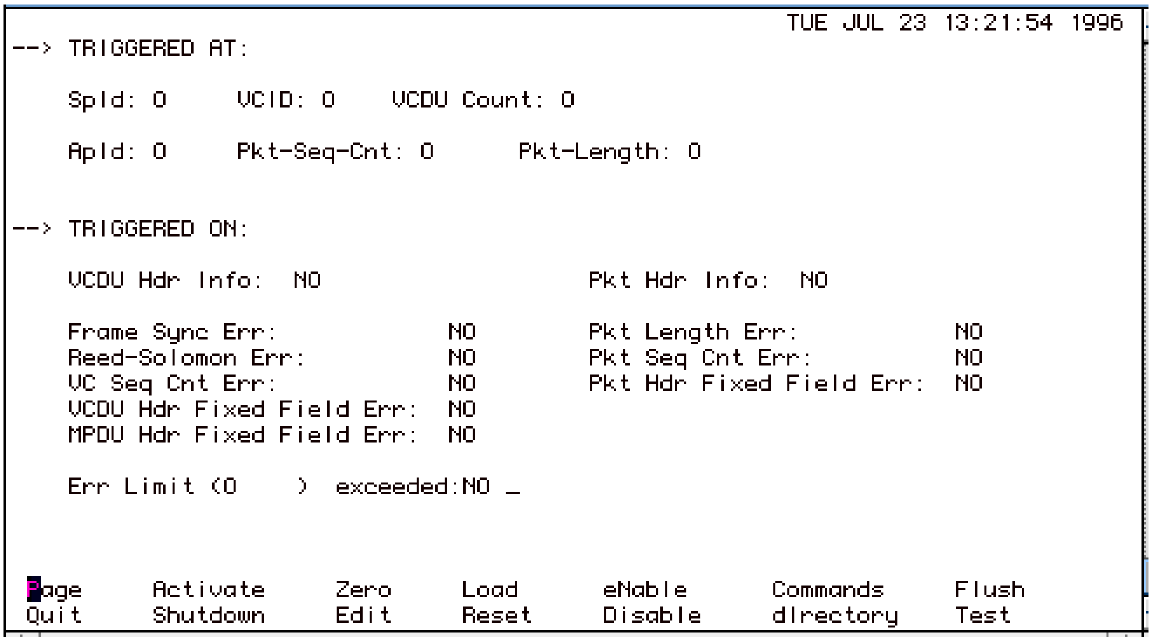
Packets: number of packets processed for each pair of VCID and APID.

CRC/RS-err: number of frames with CRC/RS errors.

Padded: number of packets that required padding.

Deleted: number of packets deleted during the session.

Seq Errs: number of packets with sequence errors.



```
                                                          TUE JUL 23 13:21:54 1996
--> TRIGGERED AT:

    SpId: 0      VCID: 0     VCDU Count: 0

    ApId: 0      Pkt-Seq-Cnt: 0       Pkt-Length: 0


--> TRIGGERED ON:

    VCDU Hdr Info:  NO                     Pkt Hdr Info:  NO

    Frame Sync Err:             NO         Pkt Length Err:            NO
    Reed-Solomon Err:           NO         Pkt Seq Cnt Err:           NO
    VC Seq Cnt Err:             NO         Pkt Hdr Fixed Field Err:   NO
    VCDU Hdr Fixed Field Err:   NO
    MPDU Hdr Fixed Field Err:   NO

    Err Limit (0     )  exceeded:NO _


 Page     Activate    Zero     Load     eNable     Commands     Flush
 Quit     Shutdown    Edit     Reset    Disable    dIrectory    Test
```

Fields are defined as follows:

TRIGGERED AT:

SpId: not used in ETS LRS.

VCID: not used in ETS LRS.

VCDU Count: not used in ETS LRS.

ApId: not used in ETS LRS.

Pkt-Seq-Cnt: not used in ETS LRS.

Pkt-Length: not used in ETS LRS.

TRIGGERED ON:

VCDU Hdr Info: not used in ETS LRS.

Frame Sync Err: not used in ETS LRS.

Reed-Solomon Err: not used in ETS LRS.

VC Seq Cnt Err: not used in ETS LRS.

VCDU Her Fixed Field Err: not used in ETS LRS.

MPDU Hdr Fixed Field Err: not used in ETS LRS.

Err Limit (xxx) exceeded: not used in ETS LRS.

Pkt Hdr Info: not used in ETS LRS.

Pkt Length Err: not used in ETS LRS.

Pkt Seq Cnt Err: not used in ETS LRS.

Pkt Hdr Fixed Field Err: not used in ETS LRS.

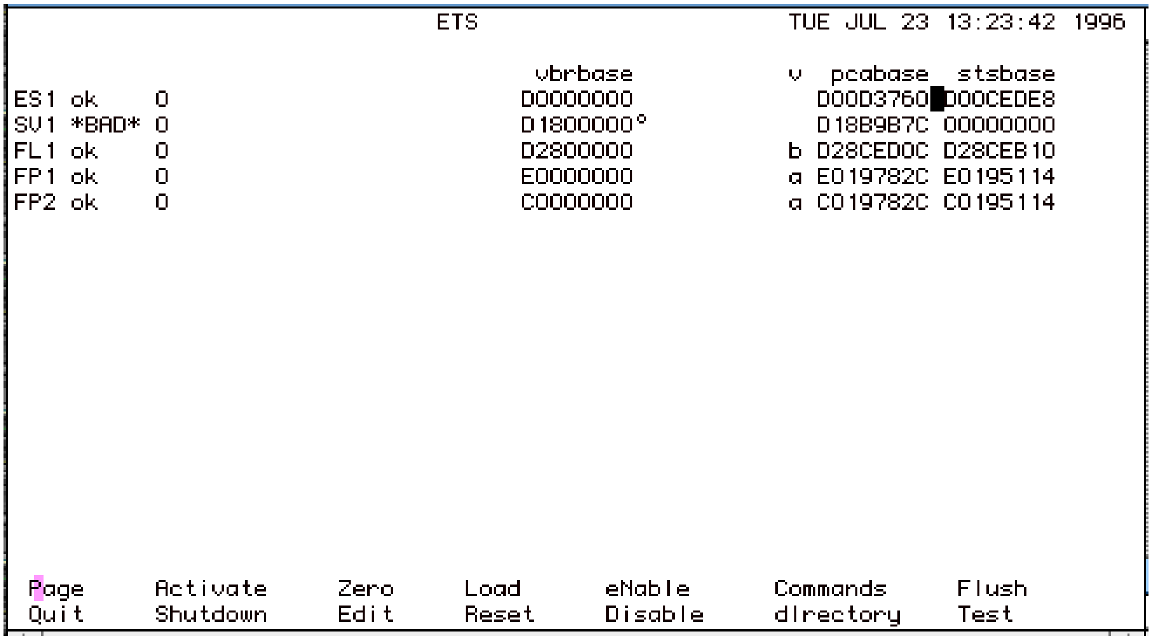
3.3.12 SYSTEM STATUS PAGE

The System Status Page allows the user to select subsystems, network health, and various status pages for cards in the LRS VME rack.

```
PAGES-Press ^G to exit
Help      HELP Information
Cards     Cards
System    Subsystems
Network   Network
ESSTATUS  ES Subsystem Status
SVSTATUS  SV Status
SV2STAT   SV AOS Status
SVVCSUMM  SV VC Summary
SVSRCSTA  SV Source Status
SVEOSTAT  SV EOS Trigger Status
FLSTAT    Forward Link Status
FPSTAT1   FEP Status 1
FPSTAT2   FEP Status 2
TBPSTAT   EOS TBP Status
BPSTATUS  CBP Status
```

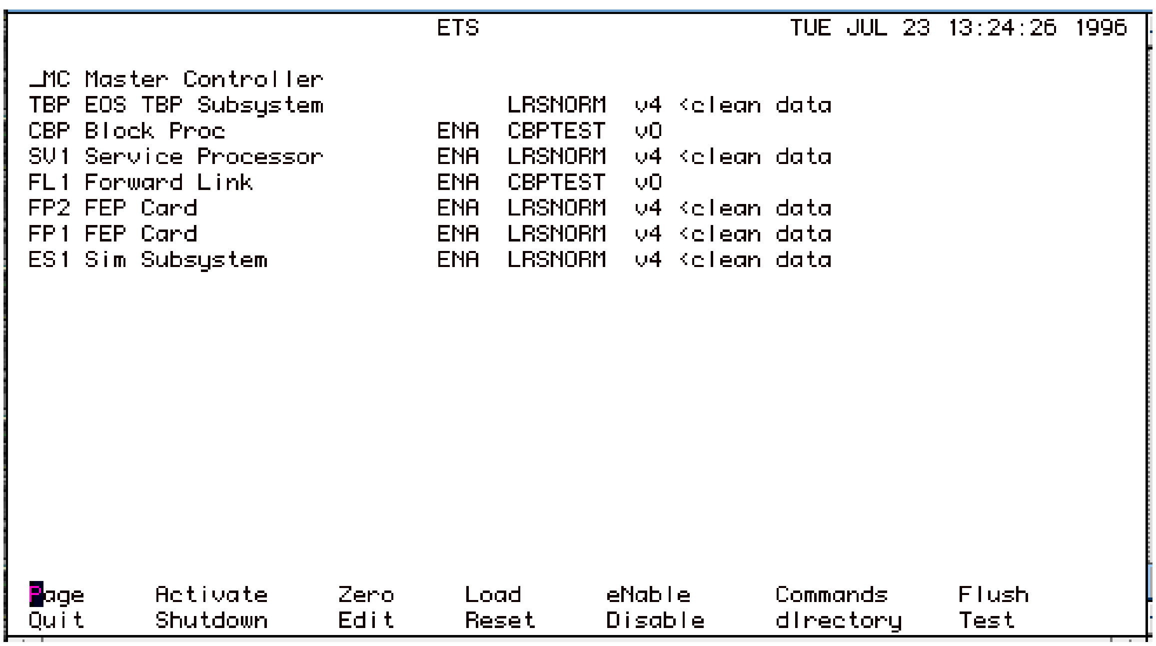
3.3.13 CARDS STATUS PAGE

The Cards Status Page provides overall health information for all plugged-in cards, and the associated memory map for each card.



3.3.14 SUBSYSTEM STATUS PAGE

The Subsystem Status Page provides an overview of all cards in the system (e.g., whether the card is enabled or disabled). If enabled, the user can easily identify the catalog that enabled the card.



3.3.15 ETHERNET CONNECTIONS STATUS PAGE

The Ethernet Connections Status Page overviews all assigned ports and associated sockets, and specifies how connections are used (e.g., for transferring commands and responses, subsystem status, or event messages).

```
                              Ethernet Connections       TUE JUL 23 13:25:08 1996


                              Listen   Data     Connect
Port    Sent       Received   socket   socket   count
3001    0          0          23       31       1        Commands & Responses
3100    0          0          25       27       1        Status
3201    0          0          24       33       1        Event Messages















 Page     Activate      Zero      Load       eNable      Commands      Flush
 Quit     Shutdown      Edit      Reset      Disable     dIrectory     Test
```

SECTION 4
MAINTENANCE

4.1 INTRODUCTION

This section overviews basic maintenance procedures and safety precautions required by the ETS LRS.

4.2 BASIC MAINTENANCE

4.2.1 WARNINGS

a. Always wear an anti-static grounding device when handling cards.

b. Follow proper grounding procedures when handling cards.

c. Only work at a static-free workstation.

d. Transport all cards in anti-static bags.

e. Ground yourself before touching hardware.

f. Do not vacuum clean the front panel or any boards with an ungrounded vacuum cleaner.

g. Always hold the Reset Switch up (on left-most card) while turning power off.

4.2.2 PROCEDURES

Perform the following activities every 2 months, or as necessary:

a. <u>Clean Air Filters</u>: remove and clean air filters. There is a chassis air filter located under the bottom chassis fan tray that is accessible by unscrewing the thumb screws and removing the front access panel that covers the bottom fan tray. Use compressed air to blow debris out, or wash it.

b. <u>Fan Check</u>: check that fans are properly functioning. There are two sets of fans: a single top exhaust fan, and a set of push and pull exhaust fans on the top and bottom of the chassis. Use a flashlight or other light source to illuminate the rotating blades. Also, listen for squeaks or other noises that indicate bearing problems.

c. <u>Remove Dust</u>: remove dust from front panels. Using a cotton swab to remove dust accumulation from front-panel buttons, indicators, and terminal ports.

d. <u>Clean Local Terminal (if applicable)</u>: turn terminal off before cleaning terminal keyboard. Use a lint free cloth, dampened with terminal cleaning solution, and wipe off the screen. Clean off any accumulated dust and dirt on the terminal screen and terminal keyboard. After cleaning, turn on the power to the terminal, wait until OK is displayed on the terminal screen, and then press ^X1 or ^X2 to refresh the terminal screen.

SECTION 5
REFERENCE DOCUMENTATION

Table 5-1. ETS LRS Reference Documentation

Subject	Document Name	Date	Source
ETS LRS	ETS LRS System Requirements Document, ETS LRS Interface Control Document ETS LRS System Test Procedures ETS LRS Detailed Design Specifications, Volume 4, 521-DDS-001 ETS LRS System Test Plan	TBS TBS TBS TBS	Code 521/GSFC
Master Controller Card/Data Buffer Controller	MVME167 Single Board Computer Installation Guide	1992	Motorola
MEDS	MEDS User's Guide, Version 1.2, 521-MEDS-001 MEDS Programmer's Guide, Version 6.0, 521-MEDS-011 MEDS Library Reference Manual, Version 1.2, 521-MEDS-009	1/92 5/94 4/92	Code 521/GSFC
EOS Simulator Card	EOS Simulator Hardware Definition Document	TBS	Code 521/GSFC
Front-End Processor Card	Front-End Processor Hardware Definition Document	TBS	Code 521/GSFC
EOS Service Processor Card	EOS Service Processor Card Hardware Definition Document	TBS	Code 521/GSFC
Forward Link Interface Card	Forward Link Interface Card, Revision B, Hardware Definition Document, 521-H/W-055 Forward Link Interface Card Software Definition Document	11/95 TBS	
Memory Card	MM-6260D User's Guide	1992	Micro Memory, Inc.
68040 CPU Mezzanine	68040 CPU Mezzanine Hardware Definition Document, 521-H/W-035	12/94	Code 521/GSFC
TPCE	ETS LRS User's Guide, Release, DSTL-96-XXX	TBS	Code 522/GSFC
SCTGEN	Spacecraft Test Pattern Generator User's Guide	TBS	Code 521/GSFC
VxWorks	VxWorks Programmer's Guide, Version 5.1 VxWorks Reference Manual, Version 5.1	1993 1993	Wind River Systems

ACRONYMS AND ABBREVIATIONS

Term	Definition
AOS	Advanced Orbiting Systems
APID	Application Process Identifier
CADU	Channel Access Data Unit
CCB	Configuration Control Board
CCSDS	Consultative Committee for Space Data Systems
CDS	Control and Display Subsystem
CLTU	Command Link Transmission Unit
CPU	Central Processing Unit
CRC	Cyclical Redundancy Check
DCN	Documentation Change Notice
DMA	Direct Memory Access
DRAM	Dynamic Random Access Memory
EOC	EOS Operation Center
EOS	Earth Observing System
EOSDIS	EOS Data and Information System
ETS	EOSDIS Test System
FEP	Front-end Processor
FLIC	Forward Link Interface Card
GMH	Ground Management Header
GSFC	Goddard Space Flight Center
GVCID	Global Virtual Channel Identifier
HRTB	High-rate Telemetry Backplane
I/O	Input/Output
LED	Light-emitting Diode
LRS	Low-rate System
MCC	Master Controller Card
MEDS	Modular Environment for Data Systems
Nascom	NASA Communications
NCO	Numerically Controlled Oscillator
OPMAN	Operations Manager
SCID	Spacecraft Identifier
SCSI	Small Computer System Interface
SMA	Subminiature Assembly
SRAM	Static Random Access Memory
TCP/IP	Transmission Control Protocol/Internet Protocol
TCPE	Telemetry Processing Control Environment
VCA	Virtual Channel Access
VCDU	Virtual Channel Data Unit
VCID	Virtual Channel Identifier
VME`	Versa Module Eurocard
VSB	VME Subsystem Bus

APPENDIX A
BOOT CONFIGURATION

APPENDIX A
BOOT CONFIGURATION

A.1 CHANGE IP ADDRESSES

NOTE: The ETS LRS requires nine *contiguous* IP addresses to boot correctly. The group of LRS IP addresses is: 198.118.197.85 through 198.118.197.93 (inclusive) when the LRS is installed in Building 25.

A.1.1 WHY IP ADDRESSES MAY CHANGE

IP addresses may change for one of the following reasons:

a. ETS LRS is moved to a new lab, causing it to be on a different network, requiring new IP addresses.

b. Current addresses are needed for other systems—so new addresses are assigned to the ETS LRS telemetry system.

A.1.2 WHAT TO DO WITH NEW IP ADDRESSES

Once new addresses are established, perform the following:

a. From the prompt on the Master Controller Card, enter **bootChange** to change the current booting configuration of the ETS LRS.

b. Press **Return** until the following is displayed:

`inet on ethernet (e) : 128.183.95.56:ffff0000 (`**`NETMASK`**`)`

c. This address will be replaced with the new address. The new address will be the first address in the block of nine new IP addresses. A *netmask* must be entered if the ETS LRS is no longer on its own secured network with a single workstation. If the netmask for the network is unknown, ask the System Administrator.

d. Reboot the ETS LRS.

NOTE: All other subsystem IP addresses will be changed automatically according to the new IP address entered above. That is why the new IP addresses *must* be contiguous.

IP addresses for the subsystem cards are downloaded from the Master Controller Card to the subsystems. This is accomplished via a boot script that loads the information directly into nonvolatile memory on the individual subsystems. The function that performs this task is called **load_bl()**, which is part of a startup script called **bootline.cmd**, found in the **boot_scripts** directory under the current release of the ETS LRS software.

To determine the IP address of a particular card, look at the load_bl() reference in bootline.cmd corresponding to that card. The first argument in the parameter list is the processor number selected for that card. The corresponding IP number for that card is equal to that of the Master Controller Card, plus the processor number, plus one.

Parameters in the argument list are defined as follows:

a. First parameter is the processor number of the card.

b. Second parameter is base address of card as seen by the Master Controller Card.

c. Third parameter is base address of shared memory as seen by the subsystem.

d. Fourth parameter is operating system image to be downloaded onto the card upon bootup.

e. Last parameter is startup script to be used to boot the card.

A.1.3 POTENTIAL PROBLEMS

A VxWorks error message may reference a Duplicate IP Address, meaning that one or more of the IP addresses being used by the ETS LRS are already allocated to other systems. Check the IP address entered above and verify that the eight addresses following it are not being used by other systems.

A.2 CHANGE HOST FROM WHICH SYSTEM BOOTS

A.2.1 WHY HOST MAY CHANGE

Hosts may change for one of the following reasons:

a. ETS LRS must boot from a new host because of network traffic.

b. Software has been moved; system should boot from the host on which the software resides.

A.2.2 CHANGE HOST

To change the host from which the ETS LRS is booting, perform the following:

a. From the prompt on the Master Controller Card, enter **bootChange** to change the current booting configuration of the ETS LRS.

b. Press **Return** until the following is displayed:

```
host name            : ets-gsf1
```

c. Enter the new host name. Press **Return** again until the following is displayed:

```
host inet (h)        : 128.183.97.44  (use correct IP address at installation site)
```

d. Enter the IP address of the new host from which ETS LRS will boot.

e. Edit the file **etsl.cmd** found in the **boot_scripts** directory of the ETS LRS software. Edit the following items in bold:

```
cd "host name:/ets/boot_scripts"
rdate "host name"
```

f. Reboot the ETS LRS.

A.2.3 POTENTIAL PROBLEMS

The following problem on the Master Controller indicates an error:

```
Attaching network interface ln0...done
Attaching network interface lo0...done
Loading...
Error loading file: errno = 0x3d
Can't load boot file!

[VxWorks Boot]:
```

This may occur because of an invalid IP address for the host.

At this prompt, enter **c** to change the configuration and press **Return** until the following is displayed:

```
host inet (h)        : 128.183.97.44
```

Verify the validity of this IP address; there may have been a typing error. Otherwise, check with the System Administrator to verify whether this is a valid IP address, or if a different address for the host is necessary.

A.3 RECONFIGURE ETS LRS WHEN SOFTWARE IS MOVED

To reconfigure the ETS LRS when software is moved, perform the following steps:

a. Edit the following configuration files found in the **ets/boot_scripts** directory of the ETS LRS software:

```
bootline.cmd
cbp.cmd
fl1.cmd
fp1.cmd
fp2.cmd
sv1.cmd
```

Replace the cd command that appears at the beginning of each file to take as an argument the new directory where the startup scripts can be found.

b. Edit **etsl_nsf.cmd** in the **ets/boot_scripts** directory of the ETS LRS software. Change the nfsMount command to match the new location of ETS LRS software. Follow this example to make the change:

```
# this scripts mounts all systems needed by the 521 SW
#521 Local Development Environment NFS Startup Mounts
hostAdd ("vdragon", "128.183.97.58")
nfsMount ("vdragon", "/usr/devel/ets/ets-low", "/ets")
cd "/ets"
```

NOTE: The host name in the above command is the host where the software now resides. If the system is not currently booting from this host, refer to Section E.2 for more information.

c. Edit the file **bootline.cmd** in the **ets/boot_scripts** directory of the ETS LRS software. Enter the new path name for the ETS LRS software as directed in steps (a) and (b):

```
smkernel="/usr/devel/ets/ets-low/bsp/sim/BOOT/vxWorks"
svkernel="/usr/devel/ets/ets-low/sub_systems/ets-sv/bsp/qp/vxWorks"
flkernel="/usr/devel/ets/ets-low/bsp/mz8130/vxWorks.rdb"
fpkernel="/usr/devel/ets/ets-low/sub_systems/ets-fep/bsp/vxWorks"
BP = 0x04000600
SV1 = 0xd1800000
load_bl(3,SV1,BP,svkernel,"/usr/devel/ets/ets-low/boot_scripts/sv1.cmd")
wait_boot_ack(SV1)
ES1 = 0xd0000000
load_bl(2,ES1,BP,smkernel,"/usr/devel/ets/ets-low/boot_scripts/es1.cmd")
wait_boot_ack(ES1)
FL1 = 0xd2800000
load_bl(4,FL1,BP,flkernel,"/usr/devel/ets/ets-low/boot_scripts/fl1.cmd")
wait_boot_ack(FL1)
FP1 = 0xe0000000
load_bl(5,FP1,BP,fpkernel,"/usr/devel/ets/ets-low/boot_scripts/fp1.cmd")
wait_boot_ack(FP1)
FP2 = 0xc0000000
load_bl(6,FP2,BP,fpkernel,"/usr/devel/ets/ets-low/boot_scripts/fp2.cmd")
wait_boot_ack(FP2)
```

d. Change the boot configuration whenever the startup script and file name have moved to a new location.

A.3.1 BOOT CONFIGURATION

A.3.1.1 Configuration to Boot from Local Disk

```
VxWorks Boot]: @
'.' = clear field;  '-' = go to previous field;  ^D = quit
boot device          : scsi=0,0
processor number     : 0
host name            : ets-gsf1
file name            : /sd0/bsp/mv167/vxWorks.local
inet on ethernet (e) : 128.183.95.56:ffff0000
inet on backplane (b): 128.183.95.57
host inet (h)        : 128.183.97.58
gateway inet (g)     :                      (be sure this field is blank)
user (u)             : vxd
ftp password (pw) (blank = use rsh):
flags (f)            : 0x28
target name (tn)     : vxetshrsd1
startup script (s)   : /sd0/boot_local/etsl.cmd
other (o)            : ei
```

Upon obtaining [VxWorks Boot]:C, enter P and <cr> to view the revised script.

A.3.1.2 Configuration to Boot from Host on a Network

```
VxWorks Boot]: @
'.' = clear field;  '-' = go to previous field;  ^D = quit
boot device          : ei
processor number     : 0
host name            : ets-gsf1 or vdragon
file name            : /usr/devel/ets/ets-low/bsp/mv167/vxWorks.net
inet on ethernet (e) : 128.183.95.56:ffff0000  (use correct IP at site)
inet on backplane (b):
host inet (h)        : 128.183.97.58   (use correct IP at site)
```

```
gateway inet (g)     : 128.183.95.1  (use the correct gateway IP at the site)
user (u)             : vxd
ftp password (pw) (blank = use rsh):
flags (f)            : 0x28
target name (tn)     : vxetshrsd1
startup script (s)   : /usr/devel/ets/ets-low/boot_scripts/etsl.cmd
other (o)            :
```

Upon obtaining [VxWorks Boot]:C, enter P and <cr> to view the revised script.

A.3.2 CHANGE BOOT CONFIGURATION FROM LOCAL TO NETWORK

To change the boot configuration, perform the following:

a. From the prompt on the Master Controller Card, enter **bootChange**, or from [VxWorks Boot]: enter C, to change the current booting configuration of the ETS LRS from local disk to network.

b. Press **Return** until the following is displayed:

   `Boot device           : scsi=0,0  then enter ei`

c. Press **Return** until the following is displayed:

   `file name           : /sd0/bsp/mv167/vxWorks.local`

   Enter location of software. For example:

   `/devel/ets/ets-low/bsp/mv167/vxWorks.net`

d. Press **Return** until the following is displayed:

   `startup script (s) : /sd0/boot_local/etsl.cmd then enter location of software.`

   For example:

   `/devel/ets/ets-low/boot_scripts/etsl.cmd`

e. Press **Return** until the following is displayed; then enter **blank space**:

   `Other           :  (this field should be BLANK)`

f. Reboot the system.

A.3.2 POTENTIAL PROBLEMS

A.3.2.1 Problem 1

The following problem upon booting the system indicates an error. This may occur because of an invalid path for the startup script.

```
etls.cmd :      No such file or directory
Unable to open startup script /sd0/boot_local/etsl.cmd   or
Unable to open startup script /devel/ets/ets-low/boot_scripts/etsl.cmd
-->
```

A.3.2.2 Solution 1

At the prom, enter **bootChange** to change the boot configuration. Press **Return** until the following is displayed:

```
startup script (s)   : /sd0/boot_local/etsl.cmd  if boot from a local disc.
startup script (s)   : /devel/ets/ets-low/boot_scripts/etsl.cmd if boot from
network.
```

Verify the correct path name. If incorrect, change it and reboot the system. Otherwise, it might be a network problem in that the ETS LRS rack can not access the startup scripts. Contact the System Administrator for more information.

A.3.2.3 Problem 2

The following problem upon booting the system indicates an error:

```
Attaching network interface ln0...done
Attaching network interface lo0...done
Loading...
Error loading file: errno = 0x3d
Can't load boot file!

[VxWorks Boot]:
```

A.3.2.4 Solution 2

At the prompt, enter **c** to change the boot configuration. Press **Return** until the following is displayed:

```
file name           : /sd0/bsp/mv167/vxWorks.local  if boot from a local disc.
file name           : Location of software if boot from network.  For example:
                      /devel/ets/ets-low/bsp/mv167/vxWorks.net
```

Verify the correct path name and reboot the ETS LRS.

APPENDIX B
EDU DISTRIBUTION CONFIGURATION

APPENDIX B
EDU DISTRIBUTION

B.1 OVERVIEW

Gateway tasks, which run on the ETS LRS Master Controller Card, provide communication between ETS LRS and remote users via Ethernet ports on the ETS LRS. A Gateway task typically operates in one of two modes: receiving data from Ethernet ports and transferring it to MEDS mailboxes, or receiving data from MEDS mailboxes and forwarding it to Ethernet ports. The port numbers from which Gateway receives data, local mailboxes used, and size of data transferred, depend on the information that ETS LRS reads during bootup to define its initial state.

B.2 GW.CONFIG

This file is used to configure the Gateway subsystem. Its primary function is to associate a mailbox with one or more Ethernet ports, and to establish the direction of data routing. For each path between a mailbox and a port(s), a configuration string must be defined. This string contains a list of path options.

Each string starts with the word "path," and is followed by the configuration fields. Available fields are as follows:

name: name of configuration string (must be unique, but can be defined as anything).

mbox: name of mailbox to be read from/written to.

on: memory region where mailbox is located.

port: port number to read from/write to (for forwarding; multiple ports can be defined).

proto: network protocol being implemented (i.e., TCP).

flag: data direction (forward or receive) and flush (flush mailbox if no port connections).

rcvmsg: maximum size of receive message.

fwdmsg: maximum size of forward message.

fwdfilter: name of function to call to process forward message (prepend __).

rcvfilter: name of function to call to process receive message (prepend __).

B.3 SETUP EDU DISTRIBUTION

From the main TPCE terminal window, change directory to:

cd /ets1/users/cmtpce

From HP General Tool Box, open two X-term windows to start the **nerd** program before activating catalogs.

B.3.1 X-TERM WINDOW NO. 1 SETUP

Setup X-term Window No. 1 for receiving real-time data by entering the following command to start listening on the preassigned port:

../nerd -total -udp -listen 5000 -binary ~/nerd_real

where:

-binary <~/file name>

a. File name of the output file (e.g., **nerd_real**)

b. Use this option for the program to place the data it receives.

-listen <port>

a. Specify the assigned port (e.g., **5000**) where data transfer would take place.

-udp <protocol>

a. Specify the **udp** protocol with which data transfer would take place.

At the end of session, perform a **Shutdown** command to disable all cards that were enabled by the catalog. Press CNTRL-C in Window No. 1 to stop the program.

In the **/ets1/users/cmtpce** directory, verify the byte count of the file **nerd_real.000**

B.3.2 X-TERM WINDOW NO. 2 SETUP

Setup X-term Window No. 2 for receiving rate-buffered data by entering the following command to start listening on the preassigned port:

../nerd -total -listen 5001 -binary ~/nerd_pb

where:

-binary <~/file name>

a. File name of the output file (e.g., **nerd_pb**)

b. Use this option for the program to place the data it receives.

-listen <port>

a. Specify the assigned port (e.g., **5001**) where data transfer would take place.

Note that TCP/IP protocol is used for this transfer; therefore, the option **udp** is omitted.

At the end of session, perform a **Shutdown** command to disable all cards that were enabled by the catalog. Press CNTRL-C in Window No. 2 to stop the program.

In the **/ets1/users/cmtpce** directory, verify the byte count of the file **nerd_pb.000**

APPENDIX C
NETWORK TEST TOOLS

APPENDIX C
NETWORK TEST TOOLS

C.1 INTRODUCTION

This section describes tools that can be used to read telemetry data from the TCP sockets established on the ETS LRS unit. The tools are UNIX-based, and run on a workstation residing on the same network. The tools are in the obj/tools/unix directory (below the project root directory, where *.* corresponds to the current release of the ETS LRS software).

C.1.1 RMSG

rmsg -h [host] -p [port number] -b [blocksize] -v [verbose]

The tool **rmsg** connects to the specified host and port, and reads data off the network. Any data is written to stdout. Block size may be specified, but defaults to 1024. The verbose option enables read statistics output to stderr. Only TCP connections are supported.

For example:

Read from **port 4100** on host **vdragon** and pipe output to a file called **data file**.

rmsg -h vdragon -p 4100 > datafile

C.1.2 EOC_SERVER

eoc_server

The eoc_server program sends a file containing single or multiple CDBs at any data rate to any port via UDP/IP. The program automatically prompts the user for type of file (multiple CDB file or single CDB file), file path and name, and maximum number of CDBs to output (this applies only to multiple CDB files). After entering this information, it is up to the user to change any of the default values such as rate, Verbose mode, port, and the file again.

C.1.3 CDS_GOOD

This program is used to connect to the ETS-LRS to receive CDBs via TCP/IP that have passed the checking done by the CBP Subsystem. The program has standard defaults and can be run by itself without any of the command line options.

The program also prints to the screen information on the TCP/IP packets it receives. A second version of this program will print to the screen all data it receives. The program is called cds_good_verbose.

The command line options for CDS_GOOD program are as follows:

cds_good -f <file name> -p <port name> -v <verbose mode> -h

where:

-f <file name>

a. File name of the output file. Default: **./cds_good.bin**

b. Use this option to change the file that the program will place the data it receives.

c. Warning: If the file already exists, it will be overwritten each time a connection with the LRS is established.

-p <port name>

a. Port name of the port to connect with. Default: **3015@vxetshrsd1.gsfc.nasa.gov**

b. This is the port number and IP address of the port to connect with. If the IP address of the LRS changes this option should be specified with the same port number and new IP address.

-v <verbose mode>

[0 - 2] Default: 1

a. 0 - Prints out the bare minimum to the screen, only giving information regarding the connection status with the port selected.

b. 1 - Prints everything in option 0 and the number and size of each IP packet received.

c. 2 - Prints everything in options 0 and 1 as well as all of the data it receives in hexidecimal and character format.

-h <Displays the usage statement>

This program can also be used to receive data via TCP/IP for any purpose by specifying a different port and filename. Example: **cds_good -p 4556@any.other.port -f other_name**

This would connect to port number 4556 at the IP address any.other.port and read data written to that port and place it in the file named other_name.

C.1.4 CDS_BAD

This program is used to connect to the ETS-LRS to receive CDBs via TCP/IP that have failed the checking done by the CBP Subsystem. The program has standard defaults and can be run by itself without any of the command line options.

The program also prints to the screen information on the TCP/IP packets it receives. A second version of this program will print to the screen all data it receives. This program is called cds_bad_verbose.

The command line options for CDS_BAD program are as follows:

cds_bad -f <file name> -p <port name> -v <verbose mode> -h

where:

-f <file name>

a. File name of the output file. Default: ./cds_bad.bin

b. Use this option to change the file that the program will place the data it receives.

c. Warning: If the file already exists, it will be overwritten each time a connection with the LRS is established.

-p <port name>

a. Port name of the port to connect with. Default: 3010@vxetshrsd1.gsfc.nasa.gov.

b. This is the port number and IP address of the port to connect with. If the IP address of the LRS changes this option should be specified with the same port number and new IP address.

-v <verbose mode>

[0 - 2] Default: 1

a. 0 - Prints out the bare minimum to the screen, only giving information regarding the connection status with the port selected.

b. 1 - Prints everything in option 0 and the number and size of each IP packet received.

c. 2 - Prints everything in options 0 and 1 as well as all of the data it receives in hexidecimal and character format.

-h <Displays the usage statement>

This program can also be used to receive data via TCP/IP for any purpose by specifying a different port and filename. Example: **cds_bad -p 4566@any.other.port -f other_name**

This would connect to port number 4566 at the IP address any.other.port and read data written to that port and place it in the file named other_name.